

RELAY PRODUCTS (PTY) LTD

MINUTES OF A MEETING HELD AT  
GEAR RATIO ON TUESDAY 13 JUNE 78

<u>Present:</u>	Mr J.E. Hale	(Chairman)	(JEH)
	Mr J. Ashton		(ASHTON)
	Mr C. Bannau		(CB)
	Mr J. Brites		(BRITES)
	Mr P. Burns		(BURNS)
	Mr K. Finatzer		(KF)
	Mr V.J. Forgett		(VJF)
	Mr I.A. Hendrikz		(IAH)
	Mr L. Jarvis		(LJ)
	Mr R.L. Jackson		(RLJ)
	Mr J. Kirtland		(JK)
	Mr W. Riedel		(WR)

JEH: We are privileged to have with us two guests whom all of you gentlemen have met: Val Forgett, President of Navy Arms and our American licensee, and Lou Jarvis who runs Val's plant in Massachusetts and who is going to be directly responsible for building the Mamba pistol... Lou is a production expert with 27 years with Smith & Wesson. We have had the benefit of Lou's help for some time and will continue to have the benefit of Lou's help through Saturday. A lot has to be done with Lou between now and Saturday to ensure that we are on the right track and that what we do is interchangeable and compatible with what our American licensees are going to do, so I should like to see the co-operation that has been extended continued, and Lou will give his own report. After Lou has given his report I'll go over a couple of things we wish to continue accomplishing. I'll give you a status report from my end at this point, and then we'll go around the table.

First, I have here for everyone's information three of the four waxes from the dies that have been completed for GEC. GEC as of today is two weeks ahead of schedule... All that you're looking at are rejects, and I went through it with them and they are supposed to have the sample pours by next Wednesday ready for measurement tests and acceptance, and of course that will be an effort between Cecil Bannau and Karl - and of course anyone they would like to



bring in on it - but next Wednesday they said they will have the first four dies tested in the correct materials. Now let's go to the problems.

GEC called me...They state that there are, and I quote, a myriad of problems dimensionally on the casting drawings they were given. The two areas they are most concerned about are the slide and the frame. The barrel drawing is obviously fine, we have it here, unless we find a problem, you know, in shrinkages or this sort of thing in the material. I was under the impression that Karl was going to work with their people yesterday, but I understand that hasn't transpired. They have stopped work on the frame and on the slide, which makes sense, until they can get these dimensional errors corrected.

At the last meeting I asked for and have not yet received a set of machining drawings done by Los with all of the problems circled in red. Now, in addition to that set of drawings, I want a set of casting drawings that were done by Los and presumably checked by Karl and Cecil. In fact I was told in a meeting here on Saturday morning when I signed those drawings off that they were checked. I want all of the errors in the casting drawings circled in red, and I want those drawings by the end of the business day on Tuesday, because I'm going to get hold of Los and try to reconstitute part of the situation with him, and, if that doesn't work, I'm going to take legal action against him. But the one thing I'm a little bit concerned about is that I have been told by two members of our team here that those drawings had been checked and were correct and on that basis were signed off. I'm hoping that what we get when we get there is a mountain out of a molehill - that we have a passionate die-maker, if you will, like some of these chaps are, and they find one or two - but the guy said, and I quote again, a myriad of problems in that there will be an overall dimension and then you add up the dimensions that arrive at that dimension and there's no similarity between those two dimensions. They are continuing with the other dies that they don't have any problems with - in other words four dies are completed, two dies have a problem, that's a total of six dies, so



that means there are eight more dies that they are continuing with as work in progress and they are two weeks ahead of schedule. O.k. so that's good news.

I have personally visited Ferroform today, spent quite a little time with Ferroform, introduced Ferroform to Val (of course Lou had already met the people at Ferroform). I have not gotten the minutes from last Wednesday's production meeting, but they were batting numbers around and, from the numbers they are batting around and from the work that I saw, if they get it out it looks like Jamie's going to have more slides and frames than you can shake a stick at. The only problem I see is I saw no work in progress for new frames. There is a myriad of the urea casting moulds set up for the slides - hundreds, hundreds, in fact I did a rough count and counted over 500. Now I don't know what their numbers are - I just counted stocks and multiplied in my head as I walked down the rows - but I saw no work in progress on frames and that really concerns me. No urea moulds, nothing; nothing dipped. They have got hundreds of frames, it looks like, in work in progress, either to be heat treated and straightened or to be... in fact they've got one lot there that Jamie is supposed to have gotten today that he hasn't gotten. There's two big boxes; I don't know how many, Jamie, but I guess maybe a hundred frames are in those two boxes.

RLJ: Your assessment walking through there is correct. There are no patterns, there are no moulds, they have 311 at ... and they have 10 at despatch giving them 321 total frames...

JEH: Barrels it looks like they have in quantity. Slides it looks like they have in quantity. But, again, I just don't understand how those people work because, if we get the 321 frames, let's say we can accept 200 of them when it's all said and done, which should be a reasonable number I would think, or maybe even more now since we are not having the metallurgy problem, in quotes. What the hell do they do, because it takes them three weeks to set up to start ~~from dipping to pouring~~, so that means we're going to have a three-week hiatic period here - that they aren't a bit concerned about (I asked the guys about it and they said oh it's not a problem, but I happen to know how long their lead times are and they are three



weeks). Now, whether you can get through 200 or 300 slides in three weeks, Jamie, I don't know, but I again see a gap in the pipeline some way down the road until we get GEC on line.

Now let me tell you the next thing: I have talked to GEC today - again with Val and Lou present - and GEC has assured me that they will be able to double their production of castings within two weeks - within two weeks - of our acceptance of their final casting. In other words, at the point in time when we have accepted their final casting and approved their tooling, or approved our tooling, in two weeks from that date they will be able to start delivering to us a thousand castings a month. At that point in time, if they can do that (and this is an option we should hold open), it allows us to tell Ferroform just to piss off.

RLJ: It's most interesting that today I had a telephone call from Telcast asking us if we were interested in them supplying, because their big deal that they were talking about with Littleton Engineering has fallen through and they have the capacity.

JEH: Well we're not interested in them at this point in time.

RLJ: I'm just telling you in case you were.

JEH: Sure, but we've got enough problems as it is. These can be passed around the table, As I said, these are rejects. I went through and they had 48 barrels they were getting ready to cast as a sample pour, and I went through and actually showed them on the tree the waxes that weren't acceptable, and they immediately pulled them down and started working on them at that point in time. It's so different, the co-operation we have been receiving, that hopefully maybe something will come of it...

These patterns are wax - o.k? - and you notice the finish on that. That's the finish we'll get on our castings, see, and the wax finish of course is better than the urea finish.



The next thing I have to report is...we had a meeting on 6th June at 8 p.m. Present at the meeting were Dr Campbell, Ronald Russell, Lou Jarvis, Val Forgett and myself. Mr Russell is a partner in Ace Pattern Makers & Foundries, and you know we have been looking for a supply of stainless steel so that both foundries can use a single source of material. We have the quotes from Europe - we've had a private caucus on that - that's something that didn't concern everybody here because it's dollars and cents. I have worked on that, and I'm hoping to get a report on that after this meeting from the people of the caucus, which is Ian, Willy and myself, but to make a long story short, five minutes before we left for this meeting, as of about 3.20, these people said they would be willing to take on the job based on a sample run of materials of the three types, and they would do it as early as next week. That would be two tons of material divided up in any breakdown we wanted to divide the material up, in the configuration we wanted the material, and you will remember we described that.

~~Now the bad news.~~ The bad news is that they want R2,50 per kilogram for the material, which is 60c a kilogram more than our quote from Bohler Steel in Austria, which includes shipping and delivering here, so I told Dr Campbell to go back to the people. He is going to do that yet this afternoon and will call me at 7.30 in the morning. Now what was mentioned was that he would, and this is again a quote, knock the spots off that price once he proved that he could do it, but that he didn't want to lose a lot of money proving a point. If he could do it then he would knock the spots off, so maybe under those circumstances and after Keith gets through with him, we may go ahead and do it anyway... just two tons of material. One, this would coincide perfectly with the sample pours from GEC and, two, would coincide with a major pouring effort that is getting ready to be done by Ferroform in that they have these 300 frames or so that they are supposed to start pouring next week.



VJF: Joe, wasn't that 300 slides?

JEH: Slides, slides; I'm sorry, slides not frames. We saw literally hundreds and hundreds of sears, draw bars and this sort of thing. Again, I don't have last Wednesday's minutes, so I don't know the numbers, but that's all there. And they have hundreds it looked to me like in the urea state ready to pour, but why they don't have frames I don't understand, since you know without the other parts we don't have a gun, but that's the story.

That's basically the end of my report except to tell you that I've been to a couple of dealers in the last couple of days with Val, and I won't go into the response from our dealers because that happens to be my problem, but it's still there and we still need the guns.

I guess next I'll go to Karl and, Karl, you tell us any problems you have and what the status is on these prints with these die-makers.

KF: I'm going to the die-maker tomorrow morning at 10 o'clock and we are hopefully going to sort out the drawings.

JEH: Do you know of any specific problems?

KF: I know of one problem on the slide - dimension problems - but the rest of it we have to talk over with the ... and I will take the whole of Bob Wait's casting drawings with me to check up where the differences are.

JEH: Let me ask you a direct question: Did you and Cecil check those drawings before I signed them off?

KF: Well we checked them, but we didn't check all of the measurements; we checked them to see if the changes we made were incorporated.

JEH: I see. No, did you check to see if the changes that were made on the new dies were incorporated but you didn't go through and check... In other words, what you're saying is that there could be transitional or transpositional errors on just putting numbers down and you guys didn't physically check those.



KF: Yes.

JEH: All right, I think that's what you're going to find then, so taking Bob Wait's drawings is probably a good idea. Do you have anything else to report?

KF: No, the next is with John.

JEH: All right, John.

JK: I think, Joe, that perhaps it would be advisable if you could give us a little bit of your time downstairs so that we can highlight the problems and what we've actually found up to now. It's a bit awkward...I still feel, even playing with this model that's just been introduced, that what I have here is a locked-up condition with the disconnecter pushing the draw bar free of the slide and the sear, the sear rather, cannot return to the notch in the hammer. This is still a condition that I think is prevailing and you say that this can't happen - it is happening, the same as we're getting a locking-up area on the lugs on the top of the barrel to the slide assembly. Apart from drawing this out up to ten times, we have found that we have got an error and it has also been calculated as well; it shows up quite clearly that this thing won't unlock as it travels back. It will glance off one of the corners, either from the lugs on the frame or the barrel. One or the other will be damaged.

JEH: I asked that a drawing be done on that, and I gave a fix for it at the same time.

JK: It has been done.

JEH: And did the fix fix it?

JK: No. Was this fix the deepening of the lugs to 2mm or something or other?

JEH: No, it was changing from doing it on the barrel to doing it on the slide.



JK: I'm not too sure, I'm afraid. I think this is where perhaps it would be advisable if you come down to clear this up.

JEH: It'd be only a pleasure. Let me ask you: Are you stopped working until you get me down there, or have you work to do?

JK: I think this is really the case. I think it would perhaps be as well if you came down and we could run through what we have done so far and you can direct us as to whether this is the correct sort of approach. What we have found the biggest problem is the basic understanding of the travel of certain components through the action of the gun, and where certain things are at certain times. I consider in this print I have got here that, when the slide is in travel, this disconnecter is pushing the draw bar to that condition. This is with the trigger pulled far forward; this is the sear - this sear can't return into the notch. For one it is locked down by the disconnecter, and for two you are pulling the thing far forward.

JEH: Wait a minute! This disconnecter has nothing to do with the sear. You just made an incorrect statement.

JK: The disconnecter disconnects the draw bar not the sear.

JEH: The disconnecter disconnects the draw bar but doesn't touch the sear. The sear is held to the rear by the spring.

JK: ...By the sear spring, agreed.

JEH: Yes, so the disconnecter has nothing to do with the sear.

JK: But it has in this state, inasmuch that the draw bar is fouling the sear and it stops it from returning into the notch. The spring can't return forward because it knocks against this face on the draw bar. Now this is something that needs looking into.



JEH: Now is that on the drawing...or is that what it's coming out on the gun?

JK: No, this is how it's coming out on the drawings. Everything is drawn to scale. Everything we've done has been calculated and drawn to scale, and we're putting it through its motion as best possible, and we're finding that we're getting foul conditions. This is one; the barrel to slide is another. Also we're finding that the top of the trigger mechanism goes right up against the bottom of the barrel.

JEH: That's supposedly been fixed now.

VJF: Could I interject something? I think this whole thing could have been avoided if a complete tolerance study had been done on the gun before all of this was done. Am I right? - because you're looking at Talbot's system and you're saying that you are getting binding. I'm not sure but has a tolerance study been done?

JEH: Yes, a tolerance study was done; but you must understand, Val, that since the time that tolerance study was done on pre-prototype runs there have been a myriad of changes made after requests to us to simplify machining and this sort of thing, and that's what we're doing now is doing a second tolerance study to incorporate these changes that have been made to facilitate production. So the answer to your question is yes in both cases, and this is the second study.

But I'm trying to think when would be convenient for you because, if you tell me you're stopped working, then it behooves me to make this as quickly as possible. -I would suggest, then, that maybe 7.30 in the morning - o.k?

JK: That would suit us fine.

JEH: O.k., between 7.30 and 8 - all right? - because I have a meeting at 10. Is there going to be a production meeting tomorrow?

RLJ: No, no; we put the production meeting off.



JEH: O.k. Does Mike Herald know that, because he didn't know it when I was with him?

RLJ: I have advised him - no production.

JEH: No production, o.k! (Thank you, Jamie.) So I will get here... I have got to get the call from Dr Campbell, see, so I don't know when I'm going to get that call, but as soon as I get that call I will leave and come here and then spend the time until I have to be in Johannesburg at 10, and then maybe I'll come back to you again later - it's not a problem.

JK: ...unless you come back when you have finished your...

JEH: No, but I have other meetings after that...because when I talked to you over the 'phone - yesterday I think it was - the only question that seemed to be of any importance I answered over the telephone.

JK: Well this I found, Joe, that what I'd done here was correct inasmuch that, by this modification to the draw bar, it would correct this problem area.

JEH: Let me ask you a question:...By this modification you are adding material on the back of the draw bar?

JK: Yes.

JEH: But you don't have any room to add material on the back of that draw bar.

JK: Yes there is, actually...I've allowed for the hammer plunger. It is rather tight there, but this does clear.

JEH: Why has this problem not manifested itself? If you say it exists, I've no quarrel with that, but if you say it exists why has it not manifested itself in the actual firing of all the weapons?

JK: Well I have been led to believe by the gentlemen concerned at



Wadeville that this - as we followed it through the pattern of operation two days ago, Friday - that they said that this was an actuality and, when we came to these certain problem areas that we pointed out were something similar to what we have here, they said this was the case and they had done something to rectify it one way or the other.

JEH: Who told you that?

JK: This would have been at Wadeville.

JEH: ...Tony...Wadeville...Tony...Peter...

RLJ: ...Peter Welkom and Jess.

JK: That's right. So everything that we had shown on the drawings...

JEH: Well I've assembled more weapons than any of those gentlemen and I've never seen this problem. I'm not saying the problem doesn't exist; I'm saying that I don't understand why it manifests itself now and didn't before.

JK: I'd say the reason that I've been following on the same train of thought is that somebody has justified our drawings.

RLJ: What we've done, Joe, is I have specifically asked John not to discuss anything with the chaps doing the assembly, unless he comes with a problem area, not to discuss it with them beforehand so that they come back to him and say yes it is like that. What John has done is said tell me what happens when you pull the trigger, they've come to him with the problem and he's been able to identify it back onto his drawings. So we have tried to keep any questions that John has asked of the chaps on the assembly line completely without giving them an introduction to it.

JEH: Is there any change in the configuration of that draw bar from the prototype, Cecil?

RLJ: Yes, the prototypes in fact were machined from solid.



CB: It's also a change from the drawings to the die, because on the drawing it shows that it has got an extra shoulder on the inside and this draw bar has not got it on.

JK: Yes, that's correct. This gun is as originally designed. The draw bars don't have this little raised portion which now is in contact with...the face is still on the same plane, but they haven't put this little raised step coming forward that contacts with the lug on the sear. All they've done is just cast full radius all the way round to just strengthen that corner.

JEH: Well that doesn't interfere...

JK: No, it doesn't.

JEH: No, that's not a problem. What I'm worried about is you told me something else is existing that you told me Wadeville told you existed, and I'm just showing you how it's impossible to exist. See, it's a physical impossibility; there's only three ways that can happen, and all three of them supposedly have been corrected now. O.k. one is that the holes were drilled crooked for the sear; two that the hole in the sear was drilled crooked, or three that the draw bar was warped, o.k? And I've just shown you and you can see for yourself.

CB: Joe, when I started off on this project in November last year, I went to Ferrovorm one day with Bob Wait and that was after the fact that... and Ferrovorm gave Bob Wait a wax for a urea pattern of the draw bar. He had requested them to make alterations and they asked him - I don't know what or where because I was just on the project then, but that I know for a fact. I don't know where they've changed or what they've changed, but I know that Bob...

JEH: Well is this draw bar to drawing?

CB: Which are in that gun at the moment?

JEH: No, which are the ones we're getting in production units now.



CB: Yes, except for that they are all...

JEH: ...but that shoulder isn't important?

CB: The shoulder...

JEH: Let me see that a minute, Val...the area in question, gentlemen - and this can't appear on the tape but it doesn't matter - is this had a little tip on it here and this went back and then there was a radius here. We allowed them - and that's probably what Bob Wait approved - allowed them to make this radius bigger to strengthen the draw bar there, because we felt that was a weak point on the draw bar.

Now I will ask a specific question: If this dimension from this point to the face of that draw bar is the same as what it was on the original drawings, then that change was approved and is an acceptable change. The only reason it would be a problem is if that was a different dimension from this point to this point, o.k? And I assume that's been checked?

JK: I would like to raise a point on this: On the casting drawings to the machining drawings the centre for the lug for the mounting of the sear has been displaced 1 mm. Now by displacing that 1 mm you are moving the working face of the sear forward, nearer to the contact of this face on the draw bar. Now I don't know what state - do you see what I'm getting at?

JEH: I see exactly what you're getting at but, if you remember the last meeting, we had this point come up and I sat here and was assured that that was not true - that they didn't move a Goddammed thing; they only moved it in relationship to the lugs here, and this was a transitory thing because they were being cast in. And I was told that it was not changed - that it is not changed. Now it's changed!

JK: It certainly moves the position of the working face...

RLJ: ...if you do change it, or it is changed?

JK: ...it does move it if you change it.



RLJ: ...if you change it...

JEH: Well it can't be changed then.

JK: Well it has been changed 1 mm. Now which is correct?

JEH: Now wait a minute; I was told last meeting it was not changed.

JK: As that model is manufactured now, it is in the changed position - it is in the new position - because I gave the figures to...

JEH: Now that's the change? This hole here?

RLJ: Yes.

JEH: Now I was told at the last meeting that that change had nothing to do with the relationship to the height of the sear.

RLJ: It's got nothing to do with the height, Joe; it's been moved back, not up.

JK: In moving this forward, it moves this face here forward as well...

JEH: Of course it will...

JK: ...which brings it nearer to the draw bar...

JEH: ...nearer to the draw bar...then it fouls the draw bar.

JK: It does.

JEH: Then it can't be moved - that's what I said, so we wasted a week...

JK: But this is where I'm getting my problem now in trying to trace out the movement of these parts. With this here, you pull the trigger and you have that movement before you take up any slack - this is taking up the slack of everything...

JEH: Right!



JK: Now, as that thing exists there, and as I found on my initial drawings, as soon as you begin to move that trigger you are pulling the sear out of the notch.

JEH: That's because the sear was moved back, so you have lost your movement on the trigger, which was more than one millimetre, because it has transposed through the... Well I didn't authorise that change - I was assured last week the change hadn't been made - it had no effect on the sear.

RLJ: The thing that was categorically stated last week is that that hole for the lug was not raised the one millimetre; it was in fact moved back the one millimetre.

JEH: I would suggest that we are getting double talk then. Either it's moved or it's not moved. Why was it moved? ...I left this meeting with the understand that nothing had been changed.

RLJ: As far as I was concerned, at the last meeting it was agreed that, provided that that hole hadn't moved up, it would be all right and it was according to drawing and that was fine.

WR: That's how I understood it as well. I don't know why... Mr Hendrikz, were you there?

JEH: Yes, Ian was there.



IAH: I remember the discussion but I can't remember what the implication was because I was not sufficiently familiar with the gun.

WR: For my part I feel positive in my mind that everybody who left - I'm not trying to be funny now - was sure of the fact that the hole had changed but it appeared only in our second drawing and not detrimentally. Now all that has been superseded.

JEH: Well I'm not sure that that has been superseded at all. Does the change affect the gun adversely?

JK: It does as the parts are placed, as the way that we've done our diagrammatic schemes and one thing and another, it does appear to change it inasmuch as you have no slack on the trigger. As soon as you put pressure on the trigger...

JEH: Well that's not a big deal. That's something you can live with, but I'm saying does it foul here? You're telling me that we have a situation here that fouls. Is that movement of the sear the reason that it fouls?

JK: Apparently not, no.

JEH: The answer's no? All right then, let me ask you one more question you can answer yes or no: Does that change materially affect the travel of the sear? It shouldn't, but you've done the design on the change, I've never seen the change, so I must ask you that question.

JK: No, I don't see how it can, but I...

JEH: No, it can't...

WR: ...to change a lot on here.

JEH: Actually the change in retrospect - and again I didn't know the change had been made, in fact I left here thinking it hadn't been done - the change from a leverage point of view on the sear



actually gives us more leverage on the sear, which isn't a bad plan...

VJF: It's not a bad plan at all.

JEH: But does it affect any of the movement or does it tie up anything - like this. Does the movement cause this problem contact here?

JK: It increases it. It definitely increases it, because you're displacing this 1 mm here.

WR: Right, we are saying then that, let's say, a certain foul condition was prevailing before the change and this has now merely aggravated it? This is what you're saying?

JEH: That's what he's saying, yes.

JK: Yes.

JEH: Now maybe that's why I haven't seen it, and that answers my question. The reason I haven't seen it is probably because I haven't seen any of the guns with that change. Why was the change made? Let's get back to that. If there's a reason for the change, let's talk about it.

JK: The way I picked it up is that there was a dimensional error between the casting and the machining drawings.

RLJ: You know, we've been accommodating that by machining on the lugs 1 mm deeper so that your hammer plunger there doesn't foul... that your sear doesn't foul on the frame. Is that right? You have been machining in 1 mm deeper to accommodate it? So what you have to do is machine 1 mm into the frame to give it a clearance there.

KF: So can I now ask my question? Is that so because the casting is not to the drawing, or is that so because the casting drawing hasn't taken duly into consideration the machining size, Cecil?



CB: No, I can't tell you that...

JEH: Well I see another problem with moving that, and that is you're going to foul your hammer strut - which it does.

CB: See, the machining drawing actually shows that you machine a half millimetre...

JEH: You're supposed to machine a half millimetre.

KF: But it's still not enough.

CB: Jesse suggested this movement of the hole because on all the other sears he had to weld up the sears - you know about that - so he got away from doing that by having that hole...the sears were welded up.

JEH: Welded up where? Cecil, welded up where? Don't walk away from me; come talk to me. I'm asking you a question and you turned your back. Where was the sear ever welded up?

CB: You know, Jesse Douglas, when Jesse was doing this...

JEH: Just tell me where the sear was welded up. Don't tell me; show me.

CB: There, and then we took it back again to fit properly.

JEH: Show me where it was welded, because I don't know a damned thing about that.

RLJ: In fact the sear itself was too short to be able to file it to fit in there. We in fact came back and said cut out the machining operation because the sear was so short.

JEH: Was the sear to drawing - casting drawing?

CB: Yes.

JEH: And it was still too short?



RLJ: That's right!

CB: There was no material for machining. The machining drawing was exactly the same size, but the machining...

JEH: But there was never supposed to be any machining on the top of the sear.

RLJ: ...on the machining drawings...

WR: Yes, but this was before. The change of machining we incorporated with Bob Wait on one of his last days. Before it was cast, but there was merely a radius at that time, so it didn't need an incision in the hammer because it was round...

JEH: I see. In other words just another square face. Well there's another problem with moving this 1 mm to the rear - this is an old gun but I happen to know the configuration. You're going to foul...

CB: This is right.

JEH: This is not right, This hammer strut is the old design hammer strut and the new hammer strut, if you move that hole 1 mm, is going to foul on the sear.

JK: It does foul. In fact it's extremely close but, with the manufacturing tolerances, it probably does foul.

JEH: It will foul. If you're on a max tolerance here and a minimum tolerance here, it's going to foul.

JK: Yes, it certainly will.

JEH: That's why people shouldn't change holes without getting it cleared.

KF: Roy, just one question: The change of that hole - is that written down on one of our inspection papers or fact finding missions or anything like that?



RLJ: No, that goes back a long time.

JEH: Well there's an alternative solution to this - it might give you the best of both worlds - and that is to move the hole only half a millimetre. We can ask Jamie if that's possible - if we tighten up the tolerance from here to here and move that hole back half a millimetre, it should not foul the hammer strut.

BRITES: Let me tell you why that hole has been moved. This is exactly to the drawings as they are now - 5 mm from that centre to that centre, which is where we take the measurement from. The reason was they have drilled this in the right position according to the drawing, then they find out the spring plunger was fouling on the sear, and Bob Wait moved that 1 mm further...

JEH: They moved it 1 mm further out.

RLJ: Jamie's going further back...

WR: So this hole is now in its original position - is this what you're saying?

BRITES: Yes.

WR: And it was modified in and now we have modified it out again?

BRITES: We had to change the angle of the spring plunger...

JEH: Well we did that for another reason, though.

BRITES: Because it was fouling on the...

JEH: Yes, but we did that for another reason as well - it allowed us to actually take 1 mm off the overall dimension on the back of the grip when we were having trouble with people finding the grip too big. So by changing that hammer strut, Jamie, we were able to change that.

BRITES: The reason why you changed that dimension from 5 mm to 6 mm was...

JEH: Yes, I see. Well, Jamie, I will ask you the same question again: If we move that in a half a millimetre, will that present a problem to you?

BRITES: No, provided they cut this deeper, the slot, they use the wall thickness there, there will be no problem.

JEH: Well we call for machining here in any case.

BRITES: No!

JEH: Yes we do.

BRITES: On the new drawings not; they...

CB: On the new drawings they've got to cast that whole area again, but they will also cast that recess in.

JEH: I see. Well they've got to cast the recess in. All right, but now we're talking about the 300 frames we've got coming now - that's not incorporated in those frames so I've got to ask this question, Jamie: Can we bring that hole in half a millimetre?

BRITES: So we have to modify that jig again? That is the third time!

JEH: Well I don't see any alternative, unless you're going to redo every bloody hammer strut.

BURNS: Can I also ask a question? How many frames have been delivered with the hole in its old position, if you want to call it that?

KF: All of the ones we've got.

BURNS: That's how many, Karl?

KF: That's about 90.

RLJ: Phil, let's get one thing straight. When you say "in the old position" you're talking in nebulous terms. The original position - ~~we haven't got any like that; we've got them all with the hole~~



moved, not so Jamie?

BRITES: We've got them all the same as the prototype.

JEH: O.k., then it can be made to work. See, we're talking about getting into full production here, and that can be made to work. I'm just saying that, if we can do that, it will take care of your problem.

JK: I can try again.

? Are you going to move the hole half a millimetre or one?

JEH: Half.

? You want to exercise that on the drawing board to determine the size there?

RLJ: Well I can't see that we can do anything unless we give you a problem statement and you come back and say that it can work mechanically - from an engineering point of view it works. Then we can say yes do it or don't do it. I don't think we can just make an arbitrary decision.

JK: But the one thing that I would just like to raise here that we mentioned primarily that the draw bar was fouling on the boss or the hammer. Has this casting been changed? There's no dimension...because somebody said they would take care of this.

WR: Gentlemen, the tape is on. We can think together but not talk together.

JEH: All right, John do a paper study on this with that hole moved half a millimetre. As far as this fouling goes, I can see if this is 5 to 1 you won't have a fouling condition, I don't think, if you move it half a millimetre, if my eyes are that accurate - so I think that ought to clear it. And I know why we didn't have the fouling condition before - because it had not been moved before - so if you will do that I think it will resolve that. As far as changing the configuration of that draw bar at this point in time,

unless you come up with a compelling reason, I just don't want to do it because that means going back and changing all of the dies now at Ferroform and going back and changing in midstream the dies with GEC.

JK: So it means that on these draw bars here there's going to have to be an operation to take this 5 radius out so that this thing is seating flat against the base of the hammer so that the double action lock is engaging?

JEH: Yes.

JK: That will have to be removed.

? Which one?

JK: This radius in the corner on the bridgepiece.

CB: The drawings at GEC have been altered. The boss where the hammer pin goes has been flattened in that area so that...

JK: But you ought to mention, Cecil, that this is what I'm getting at because I know what dimension it should be moved to and nobody has come and asked me where and how they've done this, why they've done it and, you know, this is just something I wanted to...

RLJ: Irrespective of what happens at GEC, we're sitting with 1400 of these in the pipeline already, so...

? No, we're not going to change it. I'm not talking about the draw bar, I'm talking about the frame.

CB: You know about that boss that we've changed, Karl; me and you were there that day?

KF: Yes.

WR: Is it on the drawing?



CB: Yes, it's on the drawing.

JK: They do state on the drawing that there's a 5mm radius on that.

WR: What's on the drawing now?

JK: Well I don't know what it has been changed to. I haven't seen a ...

WR: That's not the issue now. I want to know what's on the drawing.

RLJ: Apart from that I'll give you the snag sheets that we've got here which will show all the discrepancies at assembly.

WR: Cecil, you know, just to stop arguing about the 5mm radius, is that component a drawing, yes or no?

CB: The draw bar?

WR: Yes.

CB: Yes.

WR: Well then you should be able to find this out from the drawing, mod level 8.

CB: I've checked them according to Bob Wait's drawings.

WR: Right, what's the difference between Bob Wait's casting drawings and the mod level 8 drawing? Has it changed?

CB: No.

WR: So then it's the mod level 8, because that's the drawings we're working with.

RLJ: It should have been changed.

WR: I'm not saying...

- JK: Yes, because this query has arisen from these figures, that there's a foul condition from the present drawings...
- WR: ...then I maintain the drawing should give you sufficient dimensions to verify or...
- JEH: ...they put a bridging bar there that Jamie was going to knock out; that's the only thing they were going to change, the bridging bar.
- CB: So we've done away with that bridging bar because it's going to cause us a lot of other problems.
- JEH: Who in the hell told people to do away with that?
- CB: Joe, when me and Karl went over to GEC we discussed with the foundry people the problems they are going to pick up in that area. When they knock off that bar they are actually going to do more damage to the draw bar than without that.
- RLJ: The suggestion to put that tie bar in the centre there was to keep that thing straight.
- JEH: Right!
- RLJ: Now what they say is, instead of getting a draw bar with one continuous curve in it that you have to straighten out, what you'll have now is two separate little curves that are going to give you twice as many problems.
- JEH: Karl says that this has been changed dimensionally inside as well. I don't know anything about that, do you?
- KF: What about the stuff we had to file out?
- CB: Well the die at Ferroform is at the moment under-size, you know, the inside...
- JEH: Yes.



CB: ...but it's to their advantage.

JEH: ...but this still hasn't answered my question. Willy asked the question is this draw bar to drawing? You answered yes. You're telling me now that it isn't?

CB: Only inside there's a slight...

JEH: No, but "only" means it isn't!

RLJ: We have been accepting those draw bars like that since the very first ones. When Jamie came up and said they could not cast smaller than 2mm, they made it 2mm, so there's got to be a machining operation, so they increased the thickness of that thing to accommodate the machining operation. When they increased the thickness, it's on the inside that they've increased the thickness. We fettle that when we accept them. We hope that now, when it goes to GEC, we won't have that problem with those castings coming forward. When we receive those draw bars we will have this one modified on the inside so that we don't have to fettle...

JEH: Well let's go back then. You say we've got 1400 of these in operation. Does Jamie know he has a machining operation inside there?

RLJ: It isn't a machining operation; it's just to clean it up. We clean it up with a file.

JEH: Well to answer your question, this is not to drawing.

WR: I got that in the meantime!

JEH: All right, this isn't to drawing. Your answer to the question was wrong - it is not to drawing. Hopefully the ones we get from GEC will be to drawing and will be correct. Now is that correct, Cecil?

JK: Another feature that I find I don't understand whether it's acceptable or not is that condition - if the trigger is pushed forward so that it pulls the draw bar away from the hammer face - should this drawing be modified so that this thing is moving freely within the

tugs on the trigger, so that the spring retains tension on the draw bar against the hammer?

JEH: Huh?

JK: I consider that that condition where, by pushing the hammer forwards or something gets in here and jams - if you get a bit of dirt or something in here - the trigger could be pushed forward. It pushes the draw bar away from the sear on the double action...

JEH: Yes.

JK: ...now this is only my question...

JEH: No, what's the problem? You can't fire that way, and you've got to pull the trigger.

RLJ: I'll tell you what: When the back of the draw bar can in fact go round and foul on the hammer strut.

JK: Some of them have come down quite a long way and fouled. This one doesn't come down very far, but what's happening is that this part here has been driven by the trigger and it isn't free on the front. This raised portion on either side of the draw bar is a size fit, and this 3mm wide area here is 3,5, so...

JEH: That's supposed to ride on the face of the trigger.

JK: Yes?

JEH: It's supposed to do that.

JK: Is it intended to do that?

JEH: Yes, it is intended to do that.

JK: Fine, because that was another thing that I wanted to know.



- JEH: Yes, that is intended to ride - that's broken, but you can see it here; it's intended to ride on the face of the trigger... that's intended to ride on that face in a dead rest position.
- JK: The safety - playing around with my drawings I can't get the safety to disconnect the draw bar from the sear so that, when the trigger is pulled, the sear remains resting against the hammer.
- JEH: That's the same question you asked me over the 'phone.
- JK: Yes, this is...
- JEH: Well I'll answer it again: It isn't supposed to.
- JK: So it's unacceptable that the sear is drawn forwards by the draw bar?
- JEH: It isn't supposed to.
- RLJ: The confusion came in here because I told John that you wouldn't accept it with the hammer coming forward and pushing the safety off, because in previous discussions - going back to sort of October/November, when I said that the gun was completely acceptable to..., you weren't happy with...
- JEH: That's not the question John asked at all. John says that, if you put the safety on this weapon and pull the trigger on the weapon, the gun will fire. It's supposed to. There's no way to get around that. It's supposed to. Any locked and cocked gun will do that.
- JK: But there's a very marginal sort of area where this could happen through the wearing of certain parts...
- JEH: No, it can't happen because you've got a 5mm bar resting on the back of that hammer, and you would have to break that 5mm bar to get an accidental discharge... And there's no way this can be pushed to the rear and pushed forward simultaneously. It just can't happen.
- JK: I'm just sort of considering everybody as idiots that's going to handle the gun, that the thing could be on full cock on safety and

somebody comes in, the wife picks it up, it doesn't work (all right; if somebody's attacking her she's had it anyway), you turn it round and you say: "Oh, the safety's on, the gun is safe."

JEH: ...and it will fire. If the trigger is still pulled it will fire, and so will a Colt, and so will a Browning, and so will any other pistol.

BRITES: I remember right from the beginning when we made the prototypes it was our biggest battle - you wouldn't accept the guns if when you, with the safeties on and pulling the trigger, when you release the safety the trigger must not fire. I remember that...

JEH: No, no; you're talking apples and oranges now. What you remember is that we had a problem that the gun was cocked and I pulled the trigger and released the trigger and then dropped the safety the gun would fire. That's what was not acceptable. That's what was not acceptable, Jamie; not anything else. We had a problem that the tolerances were wrong and when we pulled the trigger on the gun, like that, and then released the trigger and then...and we've had that happen on several of the 14 prototypes we built.

IAH: O.k. can I ask you a question? Are you happy with the feature?

JEH: It's the only way to have it. There's no way around it.

JK: - And the trigger mechanism fouling on the barrel when she travels back...

JEH: That has supposedly been corrected now. That had to do with the height of this hole here. Cecil, Karl, is this correct? The height of this hole here - it's supposedly been corrected now?

KF: I never knew of any changes to this hole.

JEH: Well when you put a barrel - give me the barrel out of the gun...

KF: I know what - it's fouling on top there.

JEH: Yes.

KF: So there's a couple of ways we can correct it, but it hasn't been corrected.



JEH: Now see this one doesn't foul at all.

BRITES: That...

JEH: Excuse me, Jamie?

BRITES: That draw bar, is that better than the one you've got there? They are not the same. I'm sure the drawing has been changed. On this one here you've got a flat and a machined face at the top, and there you've got just a sharp corner which brings it up...can you see that?

JEH: Well now, Jamie, that wouldn't matter anyway because your trigger struts are higher than your draw bar, and that's what fouls it up.

JK: No they're not; they are size. It's size for size.

JEH: On this one it is, and that's where we were having trouble with the fouling before, was on these two rounded surfaces right here. If it fouls now, it means either that damned hole is in the wrong position, or our tolerances are too tight here, or this operation of the barrel is wrong...

RLJ: ...or if you brought the slide rails down...

JEH: ...or if you brought the slide rails down...

RLJ: They have been?

JEH: No, not now they haven't.

KF: Not the top face.

JEH: That's the top face of your slide rail, Roy...

RLJ: O.k; sure.

JEH: ...and that one doesn't foul at all. It's tighter than a frog's ass but, if the tolerances are right, it should not foul.

BRITES: Yes, we have brought that face down...

JEH: You brought this face down?

BRITES: ...by one-tenth...

JEH: Well then it will foul!

BRITES: ...but you should have more than one-tenth clearance.

JEH: No, you won't have. Well if it's one-tenth there, and then you're on a max tolerance here, then it will foul. If you're exactly right here and one-tenth here, you're right - it won't foul. But if this is on the max side up and you're on the max side down on your tolerance here, it's going to foul. So that means all you can do is tighten up your tolerance, or...

BRITES: There you can do anything.

WR: We can have one-tenth tolerance while machining this. We're holding it in a jig so we must allow for more.

JEH: But you said you dropped it a tenth.

BRITES: We had to because...

JEH: Now you're telling me you're going down another tenth on a maximum tolerance...

BRITES: Oh no, we don't drop anything. We dropped that face by one-tenth. It was 4,7 and we brought it down to 4,6 because the dimension was not tied up with the slide.

JEH: If it's 4,6, what's your tolerance down?

BRITES: That dimension stays as it is...

JEH: You're telling me you're working with zero tolerances?

BRITES: That dimension is 4,6 and our tolerance is the width of that slot.



JEH: Jamie, you dropped this face one-tenth.

WR: No, this doesn't affect it because we located a check before and afterwards on the top face, so the distance from the top face to where we started our drilling remains exactly the same.

JEH: So the hole's theoretically been dropped a tenth? Well I asked that question and was told the hole hadn't been changed.

? The hole has been kept in relation...

WR: ...in relation...

JEH: ...in relation. Well I just asked if that hole had been changed and I was told no.

? The hole hasn't been changed.

WR: As far as the drawing is concerned the hole hasn't been changed, because the hole from that face to there is the same.

JEH: That's not the hole I'm talking about.

? No, but that whole inter-relationship...

JEH: That hole has been dropped one-tenth then?

BRITES: If we machine that face down by 1mm, that hole automatically gets drilled down 1mm.

JEH: That's what I'm saying. O.k. so it has changed. All right, so then the damned thing should not foul; you're right. But I asked the question if that hole had been changed and I have been told no.

BRITES: No, not; not. No, the hole hasn't been changed.

WR: Look, the relation from this face to here remains the same, so it means the position of the hole...

JEH: No, I see what you're saying...

WR: Are you with me?

JEH: Yes; I know exactly what you're saying, but that wasn't the answer to the question.

WR: So I would prefer to change something on here rather than on the barrel.

JEH: Well you can't change the barrel, because of the locking, but that's not...

WR: It can only foul on here, unless locating the face that we've got on the...

JEH: It is fouling here.

WR: It's fouling on this face? It will foul only in the extreme position, only if the barrel is dislocated fully down and the trigger is fully back, then it will foul...

JK: That's with the barrel dislocated...

JEH: Well that doesn't show a fouling condition, does it?

JK: When you release the trigger, as the thing springs back, this moves... actually this is only 5 to 1 - it's so small it barely touches it.

JEH: Well what we could do is just take that surface up; just a polish on that surface there...

WR: You want to make it a polish operation in assembly?

JEH: No, we're trying to get away from that now. But it won't foul on every gun; see; that's the problem! It depends if you're on max side tolerances on both parts, then it's going to foul. If you're not, you're not, so I don't see how we can hold Jamie to a situation like that, you know. I just don't know. Hand-fitting itself would correct that problem; in other words take one with a barrel on the minimum side and a frame on a maximum and you won't have a problem but, if you get both on the max side, then you could have a problem. So it could



be just a polish operation on this face here. You see what I'm saying? Do you have any suggestions on this, Val or Lou? You understand that what I'm saying is that if you're on a max side tolerance on this and you're on a max side tolerance on this, there's a chance of your getting a fouling by about a tenth.

RLJ: I'm not saying it's a solution, but...

VJF: Well, as I've said, if you've done a tolerance study on the whole gun and if you still have max/max and it won't fit together, then your tolerance study is incorrect. That's all I can say.

RLJ: The only way I'd correct that at assembly - if in fact the draw bar and everything was fitted into the frame - is I'd look for another barrel that didn't foul, but that's not the solution. That's just a temporary solution. I'm still sitting there with a barrel and I'm back in the same situation the next time I want to use it.

JEH: No you're not, Roy, because if this frame and the barrel are both max then you've got a problem.

RLJ: Joe, there's no guarantee that, if someone buys a spare barrel from us, we'll send them a barrel and they're not going to be in that situation.

JK: I know the implications if you do it, but say we were to drop that hole...

JEH: Not a chance!

JK: I know the reasons why, but thought I'd just ask!

JEH: Next question! No way!

LJ: Can I ask a question here? Are the tolerances on there bilateral.

JK: I don't know offhand.

LJ: Because, if they are bilateral, could we make them unilateral within practical limits?

JEH: Yes, that would solve the problem.

LJ: Yes, that would solve it, wouldn't it?

JEH: That would solve the problem - and you're only talking in tenths. Could you check that for me, John, and let me know...

JK: That's what I did on all the practical tolerances. You know...

JEH: Well Jamie's gone over all the tolerances now, so we would have to ask Jamie if we made that change if that was a practical tolerance to Jamie. We would have to ask him because he's the man that's responsible. If it is, that's an easy solution to the problem, but, again, once it's done and once the tolerance study proves it can be done, then Jamie will have to say yea or nay. If that doesn't work, you know, then we'll look for another solution. But an obvious solution to the current problem is just a simple polish on that face. One file stroke will do it.

BRITES: Because you do that as a sub-assembly - you assemble the trigger with the draw bar - you can have a little fixture and, once you've assembled it, you can just drop it in and check...

JEH: ...and if it's on the max side you just hit it with a Bremil tool or something.

BRITES: Yes.

JEH: It's that close - but again let's take a look at it and see if we can make any allowance on the tolerance.

IAH: Have we got a tolerance problem, or have we got a size problem?

WR: I would say it's a size problem.

RLJ: If we have a look at that...

IAH: You haven't allowed in your design for a clearance between the two parts - that's fundamentally the problem. It's got nothing to do with tolerance; it's got everything to do with clearance. And, until you decide what clearance you want between those two parts, you can't even start tolerancing.



- RLJ: Well even the tolerances there are between two cast faces, so there's nothing much that you can do about it in any case. So, if it's not a matter of clearance, then we'll have to do it on assembly.
- IAH: But, if your casting capability doesn't give you sufficient closeness to prevent those two parts from fouling, then you have to machine.
- JEH: That's just what Jamie said - his suggestion - I agree.
- IAH: Joe, can we say what the clearance should be?
- JEH: Well our maximum tolerance on casting is 0,05 mm, so...
- IAH: No, no, no; I want to know what is the clearance between those two parts.
- JEH: Anything you want to make it.
- IAH: No, no; it's designed condition.
- JEH: Well it's designed to clear by about 20 thou.
- IAH: O.k. John, put a 20 thou. clearance there, before you start tolerancing.
- JEH: But again, you're right on your casting faces. Yes, Val.
- VJF: You're going to find that, when you're assembling guns - I don't care what you do with tolerance studies or anything else, this is past experience - the man that's assembling is going to have to have a file there, and every now and then take a swipe at one part or another to get it together, and I think this is your only problem. I think that you're all wasting an awful lot of time on tolerance studies and everything else.
- JEH: Well you're never more than a tenth out now...
- VJF: That's right!
- JEH: ...so a file is the answer - a jig like Jamie suggested and a file with the guy on the bench.

VJF: That's it, because when you're fitting them together, every gun - I don't care if it's a Colt or a Smith...it is the final man with a little file that matters. How many times do you have to...

LJ: Let me tell you, the company that I worked for was the only company to produce a gun that will go together, where you can dump all the parts on the floor and every part will go together without filing. This includes burrs and everything else that's on it. So there is a method, and I've already proved this at Smith & Wesson - one of the reasons I left there is because they wouldn't listen, but now Smith & Wesson are doing this - if your tolerances are right, and you work at your tolerances, you can put this gun together without filing.

VJF: Lou, tell them how many guns were produced by dumping on the floor and assembling them.

LJ: You mean in my plant?

VJF: At Classic.

LJ: 96 000.

JEH: How many have you produced at your plant then, Val?

VJF: Well we're crowding them in, but...

JEH: ...but not without filing... They file at Smith and they file at Colt and they file at Winchester, and we're not any smarter than they are!

VJF: ...and I'll say this: At Navy Arms Company I doubt if we've ever put a gun together without filing.

JEH: Right! That's the point I'm trying to make. O.k. I clarified that!

LJ: You see what we did is we found at Smith & Wesson - when I went up to the Automatic Department - 65% of their parts were being rejected. So the first time I went up to that Department because they were in trouble, the first place I went was to Rejections because that's what you look for - how many parts are wrong? - because that's where half your production is. If your parts are being rejected, this interferes



with production. So the first place I went to was right at the Rejection Counter. They were rejecting 65%, so I submitted that what you've got to do is start all over again - start right from the beginning - and start saying so much tolerance here, so much tolerance there, and that gun should go together. It has been proved in the Experimental Department that it can be done.

JEH: Well, Lou made a comment to me the day before yesterday, at about 7.30 in the morning, that he felt that you fellows were at the point where, with a little more work and help, you should be able (and I will quote him) to dump the parts on the floor and put the guns together. Now I believe I'm paraphrasing you accurately?

LJ: Yes, of course - because you had the tolerance room in there to do this.

JEH: But until we get to that point in time - and that's what we're striving for - I'm not a damned bit averse to doing like Val does or like everybody else does and that's hitting it two file strokes to give me my production.

LJ: Oh no, you've got to do that in the beginning anyway; but you're going to find that, you know, eventually you're going to get to the point where you're not going to have to do this.

JEH: Hopefully we will, but in the meantime we'll hit it two file strokes. Jamie says he can help make us a jig for it.

JK: I'm finished.

JEH: Finished? O.k. next point...

WR: Have you finished, John?

JK: Yes, yes.

WR: There's just one question: I understand the finish to be that we leave it as it is - the status quo - and, if and when we have to file, Roy will help himself?

RLJ: Right!

JEH: John is going to take a look at it from the tolerance point of view. to see if unilateral tolerances will solve the problem, then we'll talk to Jamie to see if he can live with that. If we can, the the problem's automatically solved. In the interim, though, we're not going to stop; we're going to hit it with a file, then we'll work towards what Lou is suggesting as the utopian state. Does that answer you?

WR: The status quo remains that, in essence, we do some further research.

JEH: Right! That's what I just said!

ASHTON: I've been looking at the springs - I've seen those samples that you sent me, and I've got the various details on them. Now some of them I can't measure - they're so small I can only measure by guess - so I took them to our Standards Room to get them to measure them for me. I got them back actually on my way over, so I haven't been able to do a lot with them, but I did check the recoil spring... I checked its rate and it is stressing on that recoil...

JEH: Yes.

ASHTON: ... and I wondered if you'd had any failures in the recoil spring.

JEH: No. I'm just wondering which recoil spring he tested as a sample - we have two different recoil springs!

RLJ: Jim was given a set of the latest springs ex-stock out of what we have in our billets.

JEH: O.k., but we had two different recoil springs we designed, and I'm just wondering - we had several hundred made of the first type and then we went to a second type where we increased the tension...

RLJ: These are the latest springs.

ASHTON: I'm talking about the type, though...

VJF: Did I get the first or second type?



JEH: You got second type.

ASHTON: I stressed this spring and I found that, in the design stress - the metal to metal condition - I got just over 100 tons force per square inch.

JEH: You actually coil-bound the spring?

ASHTON: No, I didn't; I calculated it.

JEH: Oh I see. When you said "metal to metal", I thought...

ASHTON: Well yes...

JEH: See, the spring is never coil-bound.

ASHTON: No, no, no; I'm talking about the working stress...

JEH: Oh o.k.

ASHTON: The working stress is 70 or 80 tons, but using the spec here, the design spec is back to back, close cast, and that gives a figure of just over a hundred tons per square inch, but...spec again you should not exceed 45 tons on the design stress. If you do, then your spring will gradually shorten.

JEH: No; I tell you what - I'll bet you some money. We'll give you another spring and every spring we get from them is supposedly pre-tensioned and pre-stressed, all right, and I've watched the operation, and we have found no indication of shortening of springs after this operation's been done. No, we haven't. In fact that's one of the first tests we did. But I would like you to continue on: get another spring, because that's the most important spring in the bloody gun, get another spring, you pre-stress it - because they're pre-stressed when we get them - you pre-stress it and tell me if you get any change. If you get more than a half a millimetre length change, then we may have a problem.

ASHTON: Well I say from the figures that I'm assuming there will be a problem.

JEH: Well put it this way: we haven't had a problem, we haven't seen the

problem, but let's not stop there. Let's continue to look if you see the possibility of a problem.

ASHTON: Fair enough; yes.

JEH: Because we've got all the room in the world to do anything we want in there. Now that spring is about two and a half times stronger than we really need, but that was to increase the lock time on the weapon. That's why we've gone into a second generation of springs on this gun. The other spring worked perfectly well, but it slowed our lock time down and I wanted a faster lock time on the weapon.

ASHTON: This is something I've been meaning to ask you. Not lock time - you've given me more information than I was going to ask for - but actually it was this question of the rate. This is fairly highly rated, this spring, and I wondered if that was necessary because, if you could cut that rate down, you obviously could cut the stress down.

JEH: Yes, we had the rate cut down, and I changed it personally, because it slowed down my lock time on the weapon. You see one of the things we're selling on this weapon is the lock time.

By the way, it also decreases recoil, just as a matter of interest - I'm just adding information to your list.

ASHTON: If you increase the rate, it doesn't recoil so far? So you've got more... or more pressure on the spring.

JEH: If you would continue to do that I would appreciate it, and that's something we can look into. They're supposed to be pre-stressed, right? Let me know if you get more than a half a millimetre length change. If you do, then we'll go back to our spring people and talk to them. We'll accept anything up to half a millimetre - it's not a problem, o.k.?

Lou, your turn; Lou Jarvis.

LJ: I realise that you have problems in machining. Of course you haven't selected your speeds and feeds yet, but downstairs there's a book that I brought on stainless steel and I would suggest that you get somebody familiar with it. These are starting points only and, just like anything else, it gives you a point to start - depending on your tool and your machinery and your fixtures and everything else; this will guide you on



what speeds and feeds to use on stainless steel. It will help you with your tools; it will help your tools last longer - less grinding and all round business there.

Now as far as your lubricant, it will also tell you what kind of lubricant to use. It's relatively simple if you start off with the book and take a starting point and use it.

Now the engineering department. I would suggest that they get a library started, as I suggested to you - this morning I think it was. We'll get some books over here - I'll send some - and any time you have a problem with the functioning of a gun, you can look it up in a book which will tell you exactly what the gun's doing, why it should do it, and everything else. And also a library over at the fitting, where he is; this way here, when somebody wants to know a question, he can at least look at it, and you'll get the same answer every time - it won't go from mouth to mouth to mouth so, but the time you get it on the table, you've got a different story.

Now I was over in the assembly and, when you get going here, I suggest that all your parts be all finished before they get to assembly. In other words, when you're controlling your machining and you're holding it to tolerances and everything else, don't let your fitting room take all your tolerances away because it's wrong. If you don't do that, you're going to wind up with 30 or 40 fitters and every one of them will be doing a different thing. If you are going to do any filing, if you're going to do any finishing, the part should be finished here before it goes into finishing, so that what you should have is very little selective assembly. That gun should go together.

That's another suggestion - you can't do it now, and I understand, but strive for that point. It can be done. I mean, as far as I'm concerned, everybody here is on the right road engineering-wise and machining-wise, and it impresses me very much that you all have the enthusiasm to do it because, with the enthusiasm you people have, you're going to be very successful with this gun.

Let's see if I can find another thing. Yes, all right; I've got to get together with somebody on barrel reamers; your reamers are wrong. What you need on your reamers is a moveable pilot; that's so that your reamer moves and your pilot is on the inside of your bore; it's stationary, and your reamer will move through and not scour the inside of your barrel. That's what's happening right now. That's why you're getting some lines but, if I can get together with somebody, I can draw these things out and this will help you like hell.



I mean it will help you save barrels and everything else. I can help you design some reamers and show you what to do, and this way here will be a hell of a lot easier when you're going to ream your barrels.

JEH: Well about that, don't let me interrupt you - you're probably going to come to it anyway. You know one of the major problems we're having, as everybody knows, is the lack of the ability to machine this slot here and the slot in the frame. Lou says that that is absolutely duck soup and he can sit down and work with Jamie - if we can have one of your design people in, he will actually sit down and sketch a tool - so we can do that with the products we have right in house.

VJF: Joe, I asked you to bring a Model 39. This is the gun that Lou worked on at Smith & Wesson. This contains that machined slot that we've all questioned about and that Joe says we're having a problem developing a way to machine this slot. See here we have the gun that Lou worked on; Lou cut the slots. There's the slot; look at it. Show them the barrel too; show them the slot on the barrel. There you go!

JEH: I'll pass these to Jamie; but, Lou, I think Jamie's already talked to you. Lou, you've already talked to Jamie about this, so Jamie's probably familiar with it.

LJ: Yes, we're going to get together on this, but I also would like an engineer so that he can get the sketches, you can get something going, and I think this will move in the right direction a little faster.

JEH: Karl, would you work with them?

BRITES: ...this is a different design.

LJ: It doesn't make any difference.

BRITES: Yes, it does.

LJ: Not to me it doesn't!

BRITES: This here you can turn, right? There you can't turn it.

LJ: Well I'm going to show you how to do this, Jamie.



BRITES: No, look, I can do that as well - no problem.

LJ: Then I don't have to show you.

BRITES: No, no; I appreciate what you're going to tell me - when we're going to discuss it - but I have said that I can machine that slot.

JEH: You told me you couldn't machine the slot in the slide!

BRITES: What I have told you last week - I can machine anything you want, right? I can do any machining you want.

JEH: Jamie, I hate to stand corrected but this is going on tape - you have told me on more than one occasion that you couldn't machine the slot in this slide without a major capital expenditure.

BRITES: It will cost you money to build the tools to machine that.

JEH: But Lou says that's simply untrue!

LJ: I'm going to show you what to do, and then you can sit down and decide what it's going to cost you, but it isn't a big deal.

JEH: See, that's the point - I think when we've made a breakthrough we'll get away with some of the problems we've had with the barrel and slide.

BRITES: But you also must see this gun. This slide is different from the one we're making here...

JEH: Well I assume that Lou has...

BRITES: That's right! You can push it through a tool there and plunge that in. You can't do the same thing there.

VJF: Well Lou showed us how you do it.

JEH: Lou showed me how to do it. If he can show me how to do it - and I'm not very smart, Jamie - he should be able to show you how to do it because you're the fundi!

BRITES: Look, I said before we can do it, but it isn't as simple as this slide here because you have to...

LJ: That's not simple! That particular one is not simple! You've got a slot in here - this is simple.

BRITES: That slot is simple?

LJ: Yes, yes; see we...

JEH: Let me tell you, Jamie, if you can do that - if you can give me those square shoulders - you can forget all about your induction heat treatment problem.

WR: Gentlemen, can we stop here. As far as I'm concerned, Lou has offered to help us. I'm sure Jamie will listen and, from my side, Karl Finatzer will make the necessary sketches, and if there's still contention let's come back to the conference, but I don't think it interests all of us here.

LJ: I can help however...

WR: Sure; thank you.

JEH: And you can help on the barrel reaming. You could work with Karl and Jamie on getting the barrel reamer problem solved.

LJ: Yes.

WR: Anything else?

JEH: Lou, do you have...

LJ: No; that's all for now. I mean those areas there I think will help.

JK: What Lou said earlier on - if I could throw something in - he mentioned some books or information and so on - that we have a central library where we disseminate information to everybody in the group that requires it...



JEH: No, what I've asked Lou to do, so you'll know, is send me three sets of books. It's just a few books, and he's going to send me three of each book; one book will stay in my library (unless it's duplicated - I may have it already in my library - in that case then we'll have a spare); one set of books will go to Gear Ratio for Karl's use and machining, and one set of books will go to Roy's office, so everybody's reading the same book at the same time.

LJ: There's another note I'd like to add here: When you're downstairs machining (later on you're probably going to do the same thing you do upstairs - I'm sure you do it now because everybody has to do it), as you're going through your operations - I realise you're only doing 100 to 150 guns at the moment, but get used to somebody checking the work that the people are doing. Have them check the finishes; your finishes are very important. Right now I'm sure everybody knows what they're doing, but some of the holes are lousy and they aren't finished properly - but this all has to be checked as the operation is going through. When you get your lubricant, your finishes will be better, there's no question about it, so get used to the fact that you've got to have inspection on the floor, checking the work as it's going through, because it's very very important when you're making decisions.

JEH: And by the way - Jamie and Willy for your information - Val and Lou have both said again that, if we need any parts, any tools, any cutters, any kind of help we need at all, you let me know. I'm in day to day contact with Val by telex, and they'll get it to us.

WR: We have spoken to each other about that...

JEH: Lou, do you have anything else?

LJ: ...The only thing I said was: If it was me, I would like to see John as head of engineering on this project.

JEH: As the Project Engineer...

LJ: As the Project Engineer, because of the fact that he's so willing and he goes out of his way to do so much to follow through on this. I just made that recommendation because I think he's a guy who just goes out of his way to work, and that's the kind of a guy I'd like as a project engineer for me, I'll tell you right now.

JEH: Thank you; I wanted that on record. Ian?

IAH: Not a chance!

JEH: No, I meant what do you have to say?

IAH: I want a few questions answered, please. How were the materials specified?

JEH: That's already been answered once; it's on the records.

IAH: Two, then...

JEH: I'll answer it again if you'd like, Ian; I'm not being dumb, but it is on the record. I did not want to reinvent the wheel, and we had used the specific types of stainless in America in investment casting that we specified for this gun. There was only one change to that, and that was made from the...

RLJ: 440C.

JEH: Well I changed that a long time ago, but the 431 to 410 for the slide and the frame, and that was done to quote facilitate our foundry operations here with the approval of our metallurgist. But the specific material types, Ian, for the specific parts in the gun was done very very empirically. It was done based on exactly what we had done in America on exactly the same kind of weapons in investment casting.

IAH: That doesn't add up to what Lou Jarvis told me - that they hadn't been casting these guns over there...



JEH: He said he hadn't!

LJ: I hadn't!

IAH: You hadn't?

LJ: No!

IAH: I see; fine.

JEH: Val investment cast a gun 22 years ago!

VJF: The first gun ever to be totally investment cast!

RLJ: Was that stainless steel now?

VJF: No, this was just casting - a cast gun, but it was not...

RLJ: It was not stainless steel.

JEH: The stainless steel is easier to cast than mild steel, my friend.

IAH: Well if that's so, that's so; I won't argue. The position is that, when you go to AISI steels as such, the casting specifications of ACI make the castings different. Now, are the local steels to be exactly to the AISI standards, or are you going to use the ACI standards for casting?

JEH: I can't answer that question because I don't know the difference. I will tell you that the casting material is to be to the specification as laid down by our consultants and accepted by both foundries.

Oh, that's right; you weren't here when we started, Ian - we're further along in trying to develop a single source for material, o.k? Remember, I brought that up last week? We're further along on the project; I'm supposed to be getting another answer about 7.30 in the morning. I had a call just before I came to this meeting; we have found a local foundry who says they are willing to undertake the project, but their costs thus far are higher than what our costs would be from Bohler Steel in Austria, so Dr. Campbell is getting together with them

this evening to see if he can't do something about those costs, but that would give us a single source of supply. But again, to answer your question, the materials specification we're using is the materials specification as laid down by Professor Mavrocordatos with the acceptance of both foundries. Now which one of those falls under the AISI or the other specification you're talking about I honestly don't know the answer, but all you have to do is look at it to find out. Do you have the specification?

IAH: No, I have information here which I've gathered. I would like the specifications because, as things are at the moment, you're operating without proper specifications - that's a candid and full statement.

JEH: I disagree with you!

IAH: Well you can disagree.

JEH: Well you're on record saying what you're saying, and I'm on record saying what I'm saying, and I think you're dead-ass wrong!

IAH: All right, will you please produce for me a proper written specification for each of these materials for the application of every item.

JEH: I thought you had been given that.

IAH: No, I haven't.

JEH: Well you were supposed to have.

IAH: All you have is a whole lot of numbers against each item - 410, 431, or whatever - that's all. That's not good enough...

JEH: Ian, I don't understand your problem!

IAH: Nowhere are the physical properties specified, and this is of paramount importance.

JEH: I've got to tell you something, Ian; if you will read the Goddam materials specification, the tensile strength, the ductility, everything you're asking for is an integral part of that steel specification.



IAH: It doesn't! It depends entirely on the way you heat treat it.

JEH: Omigod, does he want to know our heat treatment program?

IAH: Every one of these steels is subject to a heat treatment condition...

JEH: Ian, are you trying to reinvent the wheel?

IAH: No I'm not! I'm trying to get...I want...

JEH: O.k., you've got our heat treatment program...you've got it.

IAH: I haven't got it!

JEH: Well that's because you haven't asked for it.

IAH: I have! That was the very first thing...

JEH: Then how come you haven't been given it?

IAH: I don't know. I'm waiting...

JEH: I haven't the foggiest idea either. Ask your own group.

IAH: I'm not asking my own group. You are the design authority and that's where it comes from.

JEH: That is in house.

IAH: What?

JEH: The heat treatment specification for these steels. It's in house. You have it in house. It's in this building.

WR: Can I interrupt for a minute? The heat treatment specifications are the specifications that came from Mavrocordatos...

JEH: That's right, and re-worked by John Currie with the acceptance of Mavrocordatos.

WR: That's what I thought.

JEH: As far as I know, you've got it, Ian.

WR: Whatever is written down you've got, let me put it that way. If you have got it now or not in the implied sense, you too can find it. What I've got you've got.

JEH: Maybe it isn't what you want - don't get me wrong - but I thought you've got what we have.

Where'd my barrel get to?

VJF: I'm not going to give it back for a minute.

JEH: Oh o.k!

VJF: ...I think, to bring this into perspective, what this gentleman is asking...these other sheets here where you would have part number - like 416 - and he's saying that all it says is "Barrel is 416", and this is all it's telling him - am I right there? - but you take 416 stainless and, depending on what you do to it, you can get everything from - you know I'm joking - cream cheese to tungsten carbide. Am I correct there?

JEH: Correct.

VJF: What he needs to know is, when you take that 416 stainless, what do you do to it?

JEH: That's all...

VJF: The exact specifications on what is done to it and, after it is done to it, what do you have? Ian, is that what...

IAH: That's quite correct.

JEH: Ian, that's all been done.



VJF: I can understand his position completely, so all he has to do is take the heat treat specifications that you have, take his steels, and you will get the end results according to the heat treat specifications - right, Ian? This is what you're after?

IAH: No, I'm after the other way round! I want the physical properties stated so that the steel and the heat treatment can be matched to give those properties. It is the physical properties that count, not the chemical properties and the heat treatment. The chemical properties and the heat treatment will give you the physical condition by selection so, unless you have the physical properties, you've no place to start - and the physical properties are what's lacking. That's fundamental to the whole issue.

VJF: Well you can approach it two different ways. You're approaching it in one way and they're approaching it in another way. They're giving you the physical properties of the end results of what is done to the stainless, and this is what they want, but you could take the end results of that and approach it from the other angle, use another stainless - if you wanted to - and heat treat it to those very properties - am I right? - so you're approaching the properties in two different ways - I can see his point on that - but he already has what he wants on the end results of that because you've stated what you wanted by the end results of the heat treatment you do on 416... and I think you're making a molehill out of a mountain.

JEH: I totally agree.

IAH: I don't!

JEH: Well then do what the hell you want, but I'm not changing.

VJF: O.k.

IAH: I'm not going to change anything.

JEH: Well you've gotten everything you've asked for; it's just that you're not interested in putting it together. You can either start at the back or you can start at the front; we started with what we wanted - all right? - and then we took the material to get what we

wanted, and we arrived at that, and that is in the heat treatment program which has been written by Professor Mavrocordatos with the help of Wits University and modified and accepted by John Currie, and the end result is what we want. We've been fighting with them for months about this; we've finally gotten what we want. If you think for one instant I'm going to re-write that specification, you're wrong.

WR: Can I just say something here? There's just one little problem that I've recalled from last Wednesday's meeting: It does appear that more recently John Currie seems to feel again that the temperatures as given by Mavrocordatos are no longer achievable. If you can refer to those minutes

RLJ: These are the minutes of the meeting. If you can just refer to these minutes - if you would like to read them out for the benefit of the tape...

WR: There's nothing I can add out of my head, eh?

RLJ: I'm sorry about that. These should have been with you before the meeting but unfortunately they...

WR: This question here isn't right. John Currie didn't say the last sentence.

RLJ: What was that?

WR: You say John Currie stated the heat treatment temperature range was not compatible with Gear Ratio equipment and could not be adhered to. I said that. That's a fact.

JEH: I suggest that this is a fine time for John and you to come up with that when he's been working with the Professor for six months.

WR: No, no, no; all I'm saying is that the specifications have been basically laid down. All I've reported to that meeting is that John has come back to me and said the temperature range as given by Mavrocordatos doesn't take into account the fluctuation of composition which we have.

JEH: Wait a minute! That was solved at a meeting two damned months ago, Willy. It was solved in that John Currie sat right at this table and said that he didn't have that problem any more because he was able to work with



John Smith. I can almost quote him!

WR: I'm not suggesting that. All I'm saying is what has been said to me.

JEH: Well all I'm telling you is that you're getting two different stories; that men sit here in this room and tell you one thing and me another.

WR: Look, Joe, I'm not even protesting that. I merely thought that, as we're coming into the area now where we are solving a lot of things, we're also coming into the area where we sort of, let's say...where we have sort of resurrected an old problem.

JEH: See now, that's the thing I don't understand. If you're resurrecting old problems, fine; but we were sat right here at this table less than two weeks ago, and John Currie sat there and told all of us that his problems were now resolved since he's been able to work with John Smith.

RLJ: That was at Wadeville; correct.

JEH: I was there; he said that, Willy.

RLJ: But I'll tell you what John is driving at here is that he has no latitude whatsoever on things that come through almost to spec, within tolerance, and he can't adjust the cycle...

JEH: Of course he can. We discussed that as well, and I told John Currie to do anything that he wanted to as long as the Professor concurred. That was an integral part of that meeting.

WR: Look, Joe - the heat resistance parts of the Professor's pack...

JEH: Yes.

WR: ...they turned out...

JEH: To size.

WR: ...too rigid.

JEH: Which one?

WR: The specs are too rigid...

JEH: Oh the specs are too rigid, or the parts are too soft?

WR: No, no, no; the specs are too rigid. That means they do not give you sufficient latitude for the change of composition, which then means a slight fluctuation of temperatures and all that.

JEH: I realise that, and John Currie was told to contact the Professor so he and the Professor could work it out.

While you sit there and talk about things not being topics for this meeting, this is not a topic for this meeting. It's something which should be handled on a level where direct lines of communication and authority have been set up.

WR: The reason why I said this is because Mr Hendrikz said that in his opinion he hasn't got complete specifications and you said that Gear Ratio was happy...

JEH: I didn't say that! I didn't say that at all! I said that...

WR: ... Gear Ratio was conversant with them.

JEH: ...conversant with them. I didn't say anybody was happy!

WR: Well this is why I say this is a good time to bring it up then, because of the problem.

JEH: O.k., well fine; let's get back to that then. If there are heat treatment specifications that you disagree with, Ian...

IAH: No, there's nothing like that... I'm not disagreeing with anything. I'm calling for a clear statement of the material, its physical condition and the heat treatment practise which Gear Ratio has now got to produce. The physical properties are the chemical nature of the material you asked for.

JEH: And I'm telling you you have it.

IAH: I haven't got it!



JEH: Well I'm telling you that you do have it, so you take it from there.

WR: Ian, when we went through the small parts, we agreed - just you and me - to go with John Currie through all the other parts. We sat together with John Currie at a meeting and we exactly determined temperatures and heat treatment and all that at a later stage.

ASHTON: This is where I asked...but this John Currie could.

WR: And this would involve all the other parts as well, because we have to go through virtually each and every single part, because each and every single part is receiving a different kind of heat treatment.

JEH: But again, to try to put this to rest, I will direct that any changes that are made, any problems that are encountered or anything be given to you, Ian, so you are absolutely current on what's going on. As far as I knew, two weeks ago John Currie had been given direction that, if he felt that the specifications for heat treatment were too rigid, he had the full latitude - and has always had the full latitude - to contact Professor Mavrocordatos and work it out to their mutual satisfaction.

And that should not even be brought up at this meeting. That's something that should be brought up at a weekly production meeting and handled there. That's not a product of this meeting but, as long as it's here, we'll put it to bed again and make it a part of the permanent record.

RLJ: In fact that's what it states on the thing here - that John Currie stated the heat treatment (and Willy corrects it and says it was his statement) temperatures were not compatible with the Gear Ratio equipment and could not at present be adhered to, and he will contact Professor Mavrocordatos.

JEH: And so I would suggest that we leave it at that. If there's a continued problem, then everybody here has a direct line of communication to me, and all John has to do is tell me he's got the problem and I will call the Professor in...I've read that and that's all part of what we're talking about, and that's what Karl was just talking about.

Yes, I'm sorry, Ian. Does that give everybody direction on where we will go on the heat treatment program - or problem, if it exists?

IAH: Except that I want to make it quite clear that, in the final, we have to put these parameters onto the drawings on your behalf - right? - and unless they are clearly stated and clearly stipulated they can't go on the drawing. It is a design function that that be done; that's not a function of this team. This team is investigating your tolerances, your sizes, and putting together the geometry of the thing. We're not designing the basic material for the gun...

JEH: Neither are we. It was done 50 years ago!

IAH: Right! Well then all I'm asking for is for those specifications to be written as a specification as I know it...

JEH: Then I suggest you take the information you've got, you write the specification as you know it and in the format you require it.

IAH: No, sir!

JEH: ...and, if you have a problem or don't understand it, then come to me, and then I'll go to the Professor.

IAH: I'm not writing specifications for this project.

JEH: Well I'll put it to you that I'm not writing any other specifications either, as they're already written.

IAH: All right then, you're going to get a gun such as it is with continuing problems.

JEH: No, because we're happy with the material we're getting now.

IAH: Are you? Tell me...

JEH: At least I'm told I'm happy with the material I'm getting now - I'd better correct that!

VJF: Could I add something? Are you sure you're getting the material that you're specifying? After your heat treating, are you getting the properties that you want?



JEH: Yes; we're sure of that because John Currie tells us we are.

IAH: Ah! What does the designer tell you?  
Hang on; it's not for John Currie to tell you that...

JEH: Ian, I'll tell you what: Let's just terminate this conversation and you and I will talk about it privately because we're getting nowhere.

IAH: This has got to be thrashed out, I'm sorry.

JEH: O.k., it's thrashed out. I am going to do no more than has been done.

IAH: O.k!

JEH: Is that thrashed out enough for you?

IAH: No, but anyway it stops here now.

JEH: Yes, so then you and I can sit down - because I really don't understand what the hell you want that you haven't got; that's what bothers me. I don't really understand what you want that you haven't got.

IAH: Well I think you understand...will you talk with him?

VJF: Joe, I really understand what he wants and I'll talk to you tonight. We'll sit down and have a good drink and I think I can tell you his problem.

JEH: O.k.

IAH: I won't be happy until you give me what you know I need, basically.

JEH: Well I'll tell you something: I haven't been happy for a long time, Ian, so one more unhappy guy isn't going to make a hell of a lot of difference.

IAH: Tell me, are they heat treating all the stainless steels that you've got here? Are you heat treating all of them?

JEH: Yes.

WR: No!

JEH: O.k., I say yes; we've just been told I'm wrong. We are supposed to be going through a homogenisation and an annealing process on all of the stainless steels, and there is a minimum specification on hardness on all parts that you cannot reach without a heat treatment cycle, otherwise you haven't got the properties that are dictated. Now you tell me, what parts are not heat treated?

WR: He was asking if we heat treat all the stainless steel parts. We don't heat treat the screws, for instance...

KF: Or the cast items.

WR: We're talking about castings?

JEH: Yes, that's all I'm talking about is castings.

IAH: They heat treat all the castings?

JEH: Yes, all the castings; yes, sir. That's what I'm talking about, because when you buy materials like bar stock and stuff, you're buying the material that you've ordered. When we cast we have to heat treat to get the material that we request.

IAH: Are the hardnesses specified for every component?

WR: I don't think so.

JEH: Yes, there is a minimum hardness specified for all components so, if it isn't implicit, then the minimum hardness would take precedence.

IAH: Where are they specified?

JEH: John Currie has it.

IAH: In what form? Is this by word of mouth or...

JEH: No, it's on the drawings. We actually sat down with the drawings and went through each part. Those that we did not write a hardness...



- IAH: These figures are not on the drawings, so I don't know if these are the Revision 8 drawings or not. Is there a hardness specified for every component?
- RLJ: Ian, I can point out that in Wednesday's production meeting John Currie asked for a clear specification on hardness on all component drawings and said that, before these were finally put onto the drawings, he would like to be consulted as to the feasibility from his production capability. That's the statement by John Currie.
- IAH: We do not have specifications for...they're not on the drawings; there's no specification. Unless it's written somewhere else as a written specification which can be incorporated into our data pack.
- JK: Excuse me, may I interrupt? I have a set of drawings here that were given to me and which I was told are a duplicate set of the drawings in your possession... On those drawings not one piece of material is quoted even, let alone heat treatment. There's not even material quoted on those drawings that we've had.
- WR: Are you talking about the big ones, the originals?
- JEH: You are absolutely correct, but it is on the latest revisions. I don't know what revision number you're talking about, but that again is not really germane to this conversation because everybody has known from day one what parts are made from what material.
- JK: No, but I'm just throwing that in. We've got a list, but I say that in actual fact those drawings that you gave me here a couple of weeks ago...
- WR: This was the reason why I told you, for the hardness specifications, we go up there to John, we ask John, "Look, John, what can you get? What is the range your parts are in with?" because we treat them to a reasonable hardness range and we put this hardness in.
- JEH: And John has a set of drawings that I have gone over with John and we have actually written on the drawings the hardness of the parts that was critical. That has been done so, when you go with John, you will pick that up. Now I see that maybe John has questioned that on other parts; I don't think he has questioned it on the parts that he and I sat down

and went over. But he and I sat down in his office over here and actually went through a set of drawings with John and he wrote them down. So that has been done, but whether it's been disseminated - because that seems to be half the problem in this damned room, that things are not disseminated - but that seemingly will be taken care of when Karl and John talk to John, all right? If it's not, then again we will sit down and we will go over it again. I can see that, if John thinks he has a problem on meeting some of the hardnesses that have been set down, he hasn't come back to me with them, so I can't assume that he has a problem. I'm only assuming by word of mouth from other meetings that there's a problem, so it's very difficult for me to ascertain where things are if I'm not told. But, as far as I know, John does know the hardness specification - he's got it on a set of drawings in his office that he and I sat down and went over, o.k?

JA: Yes; fair enough.

JK: Regarding the material changes in there, are people aware of the material change in the magazine to this 316?

CB: Yes, I think they are aware of it.

JEH: No.

WR: The actual magazine itself?

RLJ: I'm aware of a change in the base plate of the magazine to a thicker material, but not...

JEH: Nobody's ever changed the specification on that magazine. We've got a contractual commitment on that...

JK: Well this afternoon somebody 'phoned the company supplying these things - was the material 413 or something?

JEH: 17-7PH!

WR: Who 'phoned who?

CB: I 'phoned Braknan



WR: Who? Ferdie Bokus?

CB: Yes. So Ferdie Bokus put me onto Jim Turner...

WR: Yes.

CB: I wanted a material specification on the magazine, so he said the specification - that they were depressed that this...

JEH: 17-7PH!

JK: No, I think it was something else...41...

CB: ...416, but they couldn't get that in lesser quantities than ten tons at a time, so they are making the magazines in 410L.

JK: No, 316L.

CB: 316L, sorry.

WBF: I don't think 316 will work. I don't think the lips will hold up.

JEH: I don't think they will either, and I don't know a damned thing about this. I don't know who authorised this change, and you are not authorised to accept another magazine until someone - and I'm not going to contact them; that's ridiculous. Nobody is authorised to make a material change without a clearance from me.

WR: So then you must contact them...

JEH: Because, see, we're not heat treating these magazines, so we had to specify a plate that would take the set and hold the set from the free forming, all right? The specification for the material was 17-7PH, period, simple, chete! That was the material specification.

RLJ: Joe, the change that I'm aware of is the thickness in the base plate.

JEH: Who told you they had changed all this?

CB: I 'phoned this afternoon to get a material specification for John.

JEH: Yes.

JK: I required the specification for the magazine base...

JEH: Sure; for the drawing.

CB: So then I was told this over the 'phone. Prior to that I knew nothing.

JEH: Jesus wept! I don't believe this!

WR: Roy, are you going to follow up on this? ...gentlemen, please can we come back to the meeting - we have got only one tape.

JEH: Yes, let's go back...

RLJ: I will follow up on it to find out exactly what they were using, to certify with Ferdie Bokus that that is in fact right. I will get it in writing and then, Joe, you will have to discuss with him what the material spec is.

JEH: The problem is that, if I remember, 316 is - I don't have my book. Does somebody have a book here on stainless steel types?

VJF: This has some information on it. 316 is just a non-hardening metal.

JEH: Well it depends on the state we get it, see, because we're not heat treating it. That's why I specified 17-7PH, because I knew that would hold up on the lips, you know, from just a free forming. Well all we can do is, Roy, you check on that - I want somebody to contact me from Brakpan - no more magazines are to be accepted from anyone without my written authority.

And the problem is we just signed a contract last night for 10 000 magazines based on our 17-7PH material.

RLJ: They're not stainless though?

JEH: Yes, they are stainless.

RLJ: Has he asked for stainless now?



JEH: I told him that was what he was going to get, because Colin told me that's what they wanted to do. Roy, I went over this with Colin at great length; he said he went over it with

RLJ: Well I don't know about this; it's the first I've heard that they are going to be stainless magazines.

JEH: Well it's not really important that you know, as long as you're kept informed eventually, but Colin went over and talked to Turner and called me back - remember, that was his instruction, to call me back.

RLJ: But you see it is germane to me because I've got to do pricing.

JEH: No you don't; I've already done the pricing, and Colin's already told me there's no difference in the price of stainless.

RLJ: But I've got to add in, Joe - just give me a piece of paper - I've got to add in for assembling the magazines; I've got to add in for the follower; I've got to add in for the spring.

JEH: The follower is done; the spring is done. We use our current spring and follower.

RLJ: But I've still got to put the price on.

JEH: You gave me the price. It's hand written on the bottom of that letter.

RLJ: Oh you've got it then?

JEH: You gave it to me, Roy!

RLJ: Look, what I'm saying, Joe, is that, if you are finishing off those magazines in stainless...

JEH: They finish them off. You don't finish off anything. Remember, I went over that with you in your office? They furnish us with magazines ready to be sold. You don't finish magazines at Wadeville.

RLJ: I realise that, but are they going to be blackened, or are they going to be stainless?

JEH: No, they're going to be stainless. They're going to be exactly like our magazines only in a Browning configuration. Colin told me he went over and talked to Jim; Jim said there would be no additional cost on the magazines and that they could do them in stainless and it would actually help us because of the material and quantity supplied. That's what Colin told me, but I'm not to believe Colin?

RLJ: No, no; it's right. I just hadn't heard they were going to be stainless.

JEH: They are going to be stainless, and the problem is that the signed contract is on the material specification we gave those people from day one. Now we've got a signed contract that maybe we can't fulfil.

WR: Well the new quantities are making the material...initial problem.

JEH: Ian, do you have any more, sir?

IAH: Yes; you told me that we are heat treating all the castings.

JEH: Yes, sir.

IAH: Material 431...and thus cannot be treated to given hardness, so this comes back to my point that I want the hardness specified, please, as to what we are trying to get it to.

JEH: - Ian, if you'd listen - that will all be done.

IAH: And I want to just bring up that we've now got to be sure that it's obtainable. Are you obtaining the hardness on all your 431 material?

WR: On the 431, yes.

IAH: You are getting all the hardnesses specified?

WR: They sometimes come higher on some parts than we require, but we leave it that way because we only damage...

IAH: What happens to your physical properties?

WR: Well the material is going to be more brittle. We have to judge whether



it does matter or it doesn't.

IAH: Are you judging that?

WR: Yes.

IAH: It's the wrong course. I make my point again.

JEH: There has been a material range specification on hardness given to John Currie and, as long as he is in that range, there is no problem.

IAH: John, will you get that hardness for every component, please, from John Currie - the specification for physical properties of each material, as he knows it, for each application, o.k?

JEH: That's on all the castings...

IAH: ...on each application.

JEH: Ian, anything else, sir?

IAH: No.

JEH: I think you've got a book there I want to see; maybe that will answer my question. Could I see that blue book?

WR: This one?

JEH: No, that one.

VJF: That's just a sales brochure.

IAH: This is a sales brochure.

JEH: Is that the one from the American company? I'd like to see that book a minute. O.k., thank you. That's all, Ian? It's your turn now, Val.

VJF: These are observations that I made at the department where they do the machining and in talking to the design team. I talked to three gentlemen who were working on some drawings.

Number one, these gentlemen I feel must have a gauge gun to work from. They have got to start somewhere. I was down there looking over some of the problems, we had two pistols and neither one of them would function correctly. I think they should be given a gun that is correct, so they know what the people want.

Number two...

IAH: Can I just interject on that one, please? That was a specific request of mine when we started the project...

JEH: Ian, to answer your question and to answer Val, as far as I know they were given two guns - one that reflected the earlier stages, one that reflected the later stages - and they both functioned perfectly.

IAH: Is that right, John?

VJF: Mr Hale, I beg to differ. When I was there neither one of them would function correctly.

JEH: I don't say when you were there; I said when they were given. There's quite a difference there, my friend!

RLJ: The one pistol - the gold plated model - was in fact the best functioning prototype that we made out of the original batch of 13. That pistol was functioning perfectly as far as the safeties were concerned only. The other pistol was a production model that was functioning perfectly except for the safeties. To apply the safety you had to depress the hammer, which was unacceptable to Joe as the designer.

IAH: Can we change the statement then? Neither of those guns was functioning perfectly. Each statement of yours has had a reservation. There has been no...

JEH: So the one corrected the other.

VJF: My suggestion is that the design team and a group of engineers should be given a gauge gun to work with, period.

JEH: You and I talked about that, Val; I couldn't agree more, but it can't be done.



VJF: I want my observations to be put on record. I have been brought over here to give my thoughts, and I'm going to give my thoughts, you know - right, wrong, like 'em, don't like 'em.

Number two, put in writing what you want from the - I'll use the quotes - design team. Be specific. In communications the design team should ask specific questions of management in writing, and management should give specific answers in writing. I think there's too much of this "Well I told you so", "I'm not sure you told me so" or "When did you tell me?" or anything else. If you have something, put it in writing. There seems to be a lack of communication as to what is expected of John Kirtland and his team.

Number three, evaluate production methods. More machines are needed - I understand they're on the way, but this is just my observation - and the correct speeds, feeds and coolants should be specified again. I think there should be a large sign put down there: PUT IT IN WRITING, AND BE SPECIFIC. I think we need more things to be specific.

Number four, from my observations there seems to be no supervision of or any guidance in the production of the parts. The single most important hole in the gun is being drilled and reamed with no coolant or lubrication of any kind. The excuse I was given was the pump wasn't working yet. I also observed a milling machine on which the support arm was running into the milling vice, thus damaging both the milling vice and the support arm, as a regular production operation. This machine should be checked to see if any damage has been done, but the problem was that the employee was being given no guidance.

I'll elaborate a little bit: I was raised in a machine shop, and I know what machines sound like when they're running. All of a sudden I heard this machine just run right down and almost die, and then pick up again, and I just popped right out of my chair and said: "That is not right!" I went over, took a good look at the machine and told the girl to recycle it again. As she recycled it, as the vice came under the support arm, the support arm would physically bend the vice like a bow. The threads on the vice had actually driven threads into the bottom of the support arm, and the top of the vice where the threads were was worn away so that it was egg-shaped, so you can see that this had been going on for quite a while. This looked like a brand new milling machine, and all I can say is that the strains and stresses put upon that machine when it bit into that vice probably tore out the accuracy of the table or that support arm. Also, if you'll check those parts, when they were held in that vice while it was bent like a bow,



their dimensions were changing. To me this is unconscionable - that anyone should permit anything like that. Also, to be reaming the hole and hearing the reamer just squealing and screaming as the girl brings it down with absolutely no lubrication. You had lubrication on your milling machine; why in hell couldn't they just run a little plastic hose from the pump that was working to the area where they could have used some lubrication? But to drill and ream stainless steel cold turkey to me means you're just destroying tools. How can you get any accuracy in that hole? But - no guidance; there's absolutely no-one there to really do anything. After they shut down the operation - John was there to bear witness to it - I was making some other notes and I turned to John and I said, "Why doesn't somebody shut off the machine? It's been sitting there running for almost an hour", and everybody looked at everybody else but nobody would tell anybody to shut off the machine. So finally John went over there and he figured out how to shut off the machine - am I right, John? - and that's when we said stop the operation because you're tearing the machine up. They stopped the operation but no-one would shut the machine off. You have to have somebody in charge to point out and say "Shut off the machine", "Do this", "Do that", "Do that", "Do that", but there's nobody. It's like a ship floating around down there without a rudder. Again, I've got it in big letters here, NO GUIDANCE.

Number five, change the design of the mainspring guide. Drill a hole so that a wire or pin can be inserted to facilitate assembly and disassembly. I think we're all agreed on this - that, when you're taking a gun apart or putting it together, the guide can fly out of there - I was told about one I think went through a window already. Just put a very simple hole through it, put a pin through it and, when you're putting it together, you just pull it out to have a captive spring so that no-one's going to get hurt when you're working on it. Also, after you sell the gun, remember, if you have that hole in there and somebody gets hurt and they haven't used that little hole to hold it together, the product liability comes from your shoulders to their shoulders.

Number six - a very elementary thing, but I just found it wasn't true, parts must conform to drawings. You know, this is very basic, but they don't conform to drawings. And you must have an engineer on the project - that's why we recommend that John Kirtland be given the job as a supervising engineer. You've got to have somebody down there to tie everything together, and you've got to have one person responsible. When something goes wrong, it's going to be his responsibility.



like the captain of a ship. You have a ship here sailing; you don't have any captain.

Number seven, production of barrels should be re-evaluated and a button rifler built. You cannot button rifle on a lathe, period. I'm drawing on 16 years experience of barrel making. The barrels you have are not commercially acceptable. Even on your gold plated Mamba, that would not be commercially acceptable. If you look through this Model 39 barrel that we have here, you will see that the inside is shiny. The inside of a barrel should be shiny. I picked a Mamba barrel up out of final production; it's not only not shiny inside, but there's a great big gouge where in drilling or reaming a chip has been picked up and a great big circular cut made. I have been down this road many times with my barrels and the Italians; from what I see, this barrel is drilled, is not reamed, is heat treated and then buttoned. This is what I can see because there is no final finish on the inside of that barrel before the button is pulled through. If you look at the table top of your ... it is dark, it isn't polished, and it still has machine marks on it. On every one of your barrels - Joe can disagree with me, Rolf can disagree with me, but just hold the barrel up with a glass on it and there it is.

JEH: I'm not disagreeing with the finish of the barrel; I'm disagreeing on the process that the barrel goes through.

VJF: This is what it appears to me. Now I'm saying that the bore of a barrel is just like when you plate a gun - the finish that you have on it before you start is the finish you're going to get when you're finished. The tops of your ... and the base of your grooves are predicated on the finish of your button; the exact finish that you have on your button is the finish you're going to get on the base of your grooves. This is no magic, either way, and you can tell before you start on the barrel the finished item. Your buttons are not polished enough - that's number one. Number two, I say your buttons are under-size because, even if your buttons were polished and were the right size and your barrels were not correctly polished on the inside, when you pulled that through the barrel the tops of your ... would be polished - o.k? So, to boil it all down, you're going to have to build a rifling machine. This is not a big project; we built one at Classic Arms for 600 American dollars. We can give you a sketch on how this can be done - the most expensive part of the whole rifling machine is a hydraulic pump or hydraulic system which

you probably have in house. Jamie, have you got any hydraulic systems here?

BRITES: Yes we have.

VJF: ...that we could just steal the hydraulics from?

BRITES: Anything!

VJF: Lou, how many p.s.i. do you need?

LJ: At least 900 to a thousand.

VJF: Can you give me a hydraulic pump that can deliver 900 to a thousand p.s.i.?

BRITES: I think so, yes.

VJF: O.k., that's all you need then - you have the most expensive part of your rifling machine already in house. And remember, if you need this hydraulic unit for something else, all you have to do is uncouple it and put it back on something else.

JEH: Let me interject a moment. Can Lou make this when he's working with Karl on one of his sketches so that Jamie knows...

KF: Yes, we will sketch this out to get an idea of...

JEH: But I've got to tell you something, Val: I appreciate your comments but, until this machine is made, we can't stop production and Jamie can do a better job - he has done a better job - on the barrel. I don't think Jamie's seen those barrels, because Jamie's done a much better job on the barrels. I just don't think he's seen those.

VJF: O.k., I have a few questions for Jamie. Jamie, what lubrication are you using on your button when you pull it through? What type of lubrication?

BRITES: We use no lubrication. We use a molycot oil when we pull the button through.



VJF: A moly...

BRITES: ...molycot.

VJF: A molycot oil. So this is a molygnamum sulphide-based grease?

BRITES: Yes.

VJF: O.k., well that's basically a high pressure lubricant, as we call it in the States. We use something similar to that. I'd have to get specifically what we use on it, but you must have lubrication. You must have the inside of that barrel polished so it looks like it's chrome plated. Do you have an internal hold of any kind? We have...

BRITES: Yes. Those barrels have been honed, some of them.

VJF: Well the ones I'm looking at haven't, because if you look at this...

JEH: Well Jamie's never seen that barrel, I know, or he wouldn't let it go out.

VJF: O.k. Of if you look at the barrel that's in the gold plated Mamba. Jamie, look at this barrel. This is a Smith & Wesson barrel; the inside of that barrel must be polished. We get a finish similar to that Model 39 barrel by just a reaming operation. That 39 barrel is broached or buttoned?

JEH: It's broached.

LJ: It's broached but it's also holed.

VJF: ...it's also holed.

LJ: The bore's automatically different.

VJF: ...o.k., we found that just by a high quality reaming operation Jamie could drill your barrels. I'm wondering what type of drill do you use? Do you use a gun drill or a spiral drill?

BRITES: ~~Those barrels there have been drilled in our workshops, but in future~~

we will have them drilled with a gun drilling machine.

VJF: Well with a gun drill remember the idea of a gun drill is so that you don't re-cut your chips. A gun drill is shaped like a "v"...and you bring your chips right out so you don't pick up any of the circular scouring marks that you do have on this barrel. If you need gun drills, we can supply them from the States for you.

JEH: I'd like to interject a moment. Jamie said that in the future they are going to be gun drilled. May I ask what date "future" means?

BRITES: When we've got the quantity.

JEH: O.k., what does that mean? How many barrels does that take, Jamie?

BRITES: You can't have a gun drill hold less than 500 or a thousand batches.

JEH: All right, then you're not going to have them for some time, so what we're saying is we are going to continue using the operation we're using.

BRITES: If we do 25 at a time, yes.

JEH: That's right, so I think the point that must be added...

BRITES: You see, nobody is prepared to drill you 25 barrels.

VJF: Why can't you gun drill in house?

RLJ: Val, I think there might be a discrepancy in terminology. As far as the gun drill is concerned, you're talking in terms of the actual tool used; I think Jamie is talking about the machine used.

BRITES: Well if you want to use a gun drill, if you haven't got a gun drilling machine, you have to make one and it is quite an expensive machine to make - I enquired about that already. We have to have high pressure pumps and...

VJF: All I'm saying is you're going to have problems with your barrels until you get a good internal finish, and the start of a good internal finish is gun drilling.



JEH: O.k., I totally agree, Val, but let me rise to Jamie's defence here a moment. Jamie and I have actually worked together here, and I've seen finishes on barrels coming out of there that are acceptable to me. I'm sure Jamie had never seen that barrel you just passed around here. They were doing a drilling operation and they were doing a reaming operation, and on the buttons I saw that Jamie made, and on the ones that we actually sent to Musgrave, the finish was beautiful. Now obviously the finish on the button for that barrel is not beautiful.

VJF: And the finish on the barrel on the gold plated Mamba that you're going to use as a sample is terrible. That's all I can say.

RLJ: I would say that the ten barrels that we've got in house are like this one.

JEH: No they're not; they're worse! They're like that - no, that's got a big gouge of 180 degrees through the barrel.

VJF: And on many of the other barrels, when they have pulled the button through, they have raised a burr on the lands.

JEH: Which is the finish of the button again.

VJF: Well it's just the design of the button. These buttons look like they have been made by guess and by God, that's all I can say. For buttons in America you have maybe one or two companies that make all the buttons for all of the gun companies. Now I appreciate your initiative in trying to make the buttons, but making buttons is an art - not a science. And remember, Jamie, how much over-size to the bore are your buttons?

BRITES: I can't tell you out of hand. Can I answer that question tomorrow?

VJF: I would like to know because, when you pull that button through, that complete button must be over-size to the bore, and that barrel should be like a cobra swallowing an egg as that button goes through. You should physically be able to see that barrel pop out and come back.

JEH: No, because we put it in a collar.



VJF: Well even in a collar - when we button our barrels, it takes an awful lot of pressure to pull the button through.

JEH: Of course it does!

VJF: ...many people pull a blank button through the barrel to burnish the bore before they pull a secondary button through.

JEH: I wouldn't do that on a stainless steel barrel.

VJF: I'm just saying what some people do.

O.k., number eight, specific lines of responsibility must be laid down; if something goes wrong we'll know to whom to look. Schedules must be drawn up and, most of all, operation sheets must be prepared for every part. I think the operation sheets are the weakest point in your whole thing here. You've got to have every part - a complete drawing of it, complete specifications as to material, heat treat, and then every single operation. On our operation sheets we even had a time for each operation. If you like, I can send over a sample of our operation sheets, if you'd like this.

JEH: Willy, would you like to see those?

WR: Yes, I think send them to us, please; that will be fine.

IAH: Can we have operation sheets as closely applicable to this weapon as you can find?

VJF: Well sear would be a sear, so something like that...

IAH: I'm talking about the critical operations like we've been talking about today.

VJF: Well I'm just showing you how we do it, and you're going to have to draw up your own operation sheets. We haven't started ours yet because we haven't started production. We have to go home and re-evaluate everything we're doing, take care of everything that we've learnt here, and start.

Number eleven - a recommendation. I recommend that the barrel not be cast. I think you could do a better barrel by making it two-



piece - your back end cast - and by buying stainless steel, either tubing or rod, and reaming it and rifling it, especially button rifling a straight stainless steel tube. You get away from the support, as you say, round the barrel and the lathe; a simple operation. All you would do would be to rifle the tube and then machine it and insert it in the boss at the back end, and then you could either induction braze with a silver brazing of some type on that. This is just a thought.

JEH: I already went over that with you. We've asked for quotations on doing that - the quotations haven't been forthcoming from Walther in Germany - because we could currently use the castings that we're doing and merely cut them off here and use the same technique that Browning uses. But, until we get a quotation from Walther on that, we've got to continue the way we are now.

VJF: I think with a little bit of work you could do it in house. What I'd like to do...

JEH: There's no tooling available in this country. This isn't America!

VJF: I know; I'm going to try it at home in the States and, if we can do it successfully, we'll bring the know-how over here, and a source of tooling, and I think you should buy from Tempkin Steel Company. They make roller bearings and they're what we call barrel steel or barrel tubing is the best in the world, because they've had to develop their steel technology for their bearings. Years ago they could never get the steel they needed for their roller bearings, so they developed their own steel formulation. They have their own little steel plant, and they make all their steel in vacuum furnaces, and the steel that they produce is the best in the world. You can buy the blanks for roller bearings, but I don't think you could find a finer steel in the world. This would be bearing...you can get everything you want from them; they'll supply everything you want.

Number twelve, all drawings to have as much information on them as you can - like he has said, the specifications of the material and the hardness and the finish. You will find that's the principle we work to in the States; you look down and in a little box you will have the material specified, hardness specified, and then it will have the finish and everything else. I think that you should have that.



Just another idea - once you get into this, your castings are expensive. You're going to run into castings that you made a mistake on - they've mentioned building up the sear. I think it would be a good idea if you had a gas-shielded arc - you know, a heli-arc; do you have a heli-arc here, or available? - for the repair of castings, because the status of your castings can be repaired with a heli-arc finish, and it's good. On certain critical points you can't do it, but other things - now I think you can get a better price from your investment casters if you're either going to let them repair castings or you repair castings.

CB: They do at the moment repair castings - with arc welding.

WR: It's stick welding.

CB: Yes, or they use arc on arc.

VJF: Arc on arc - well this is what they term heli-arc; we use argon and the gas shielding with the constant electrode, but in the States this is an accepted practice. I'm looking to save money, rather than pour anything with a little blow hole in the bottom of the grip back in the pot, if they can just repair with an argon arc, and I think you should accept this once you get going.

JEH: We are doing that, aren't we, Cecil?

CB: Yes, they do a lot of little...on the surface there, like that.

RLJ: We are going to give them an indication of which areas they can weld on and which they can't... and it shows up the welding - it shows up through our finish.

VJF: Well I'm just saying that I went down there today and I saw them rejecting some castings for one or two little pin holes on the under-side of the safety. To me this is a waste, but Mr Hale stated that he does not want to give them too much leeway in the beginning because, you know, they'll start taking advantage of everything. And I agree with him on this, but I'm just saying that, once you get it in house, if you run into any problems this can save you an awful lot of money.



Those are most of my recommendations but, last but not least, we are here to help you, work with you. Let us know what you want. I feel that, with the supply of cobalt cutters, you will find that cobalt works better than your carbides on stainless steel, it's about a third the price, and we can supply a lot of this material from America. Lou and I are here - tell us what you need and we'll do anything we can to help you out. Any questions?

JEH: Thank you, Val. I should like to reiterate that Val is leaving on Thursday, and his time is pretty well booked between now and then. Lou has two specific functions left besides answering any questions that you gentlemen have. One of the functions is to put together a gun personally for him to take back to America, and two is to sit down with Karl - since Karl's been assigned to this by Willy - and do the sketches of the things to help Jamie: the cutter for doing the slide locking lug and the barrel locking lug, the rifling machine, if we can get that done in house, and...

LJ: Also, Joe, I can help you out on the reaming. I can sketch reamers for him; that will help you out until you get your machine.

JEH: Because we can't stop work, that's for sure.

LJ: No, no; that's true.

JEH: Cecil, do you have anything?

JK: Excuse me a minute; may I just ask one question or raise the point that, when we were looking at some of this rifling equipment they had there, you did state most emphatically that cleanliness was next to Godliness in that the lubricant was not recycled after use.

VJF: That's right! Just a point of information, as he said. When we rifle our barrels, we take pride in our barrels. Our rejection rate is less than 3% on our barrels, and I feel that this is even too high. High Standard - I went up there when we finally got our operation going - have a rejection rate of between 25 and 30%, and the reason is we take a little more time and, as I stated, cleanliness is next to Godliness when you're rifling a barrel.

Number one, the tube has got to be mirror finished inside.



Number two, it's got to be clean, because anything that's in that barrel when you pull that button through is going to be ironed into it - if you have any dirt or little bits of chips or just anything. This may sound ridiculous, but it's very fundamental.

Number three, the lubrication has got to be cleaned, because anything that's in the lubrication when you start to pull the button through the barrel will leave a mark.

Number four, the button has got to be cleaned between every pull. What we do is we take the button out, we take the rod out, a man is there with a little tub of solvent and a rag and he cleans all the lubricant off the rod and button. The barrel is cleaned and blown out and then wiped with a cleaning patch. You pull your button, the barrel is placed in the rifling machine - the holder, the barrel is lubricated on the inside, the rod is placed through it, the button is checked again for cleanliness and wiped off with a clean rag, the lubrication is put on the button and the button is pulled. Once the button is pulled through, the rod is taken out and wiped clean, the barrel is just thrown into the tub of solvent to get all the lubricant out of it - we use a lot of lubricant, and any lubricant that drops down is caught in a little tray and discarded. Virgin lubricant is used every time; you don't just dip down into that old lubricant. It costs a little more, but then again, anything that's on the button, in the lubricant or in the barrel is going to get pressed into that barrel and dragged along and leave marks. And, as I say, the finish on the button is the finish you're going to get on the inside of the barrel.

Thank you for allowing me to bring that up, but that's how it should be done.

JEH: Cecil, do you have anything? Phil?

BURNS: Yes, but please stop me if I'm talking out of turn. I discussed with Mr Jarvis the first day he arrived here, and he agreed with me, that the face of the sear and the bend in the hammer should be machined and not filed.

LJ: Wait a minute; what I mean by machining is, if you've got too much stock on it, we machine it and then grind it. I agree it should be ground.

BURNS: Ground - that's what I'm getting at.



JEH: It should be honed.

LJ: Ground and honed, yes...

JEH: Yes.

LJ: ...to a very very fine finish.

JEH: That's the only way it's ever supposed to have been done.

WR: Yes, before it reaches the assembly line.

BURNS: We are wasting time on the assembly line, filing and messing around.

JEH: Well, number one, you should not have enough material to put a file to it. Number two, it should be honed, and each one has to be set up individually.

BURNS: Well you have a look at some of the sears that we've got there and they...

WR: This was raised previously...

RLJ: On the previous tape this was raised...

JEH: Yes, that's all supposed to have been taken care of.

BURNS: When I came in on this it wasn't taped. There were no records of the meetings...

RLJ: Today!

WR: It's on this tape; this is what we're telling you.

RLJ: On the previous tape we discussed the sear.

BURNS: O.k. - the machined face of the breach. The face of the breach block, the slide...

JEH: The slide, yes.

- BURNS: ...can be cleaned up. I discussed it with Mr Jarvis and he says it can be done by chopping. At the moment it's just touched up with a file.
- JEH: I don't know what you mean by chopping, I'm sorry. Do you know what the mean, Jamie?
- BRITES: No.
- JEH: O.k., since you're going to have to do it, explain it to Jamie and me.
- LJ: A reciprocal to the point tool.
- VJF: We call it a die filer maybe.
- LJ: A die filer or similar. We use a chopper on the breach block; that's why we call it chopping. ...no, I don't mean that you're going to take a foot out of there. What I'm talking about is just cleaning it so that you get no residue or anything on it. They'll all be the same.
- JEH: Well can you go over that particular process with Jamie, please, because Jamie's going to have to do it.
- LJ: Yes, sure.
- JK: Yes, that's the one thing I've seen on some of these weapons, that you get a high point on one side or the other here where it isn't seating properly.
- LJ: It will just clean it up so that every one will be the same.
- JEH: Can you work with Jamie and Karl on that, please? Thank you.
- BURNS: And, thirdly, what I've come across is the hammer is binding on the cocking face of the slide. You can polish it, you can do what you want, and it's just binding. This is slowing down the feed - it's causing problems with the feed - and Mr Jarvis and I this morning changed slightly - I don't mean changed the entire shape but we changed the shape of the hammer - the radius...
- JEH: The front edge of the hammer?



- BURNS: ...into the hammer. I've polished it, I've worked it without the spring, I've worked it with the spring, and it's still fouling. It picks up a little bit of metal, but where from God only knows.
- RLJ: I'll tell you another thing, Phil. If you do that to the hammer too much and the hammer comes too far forward, then it won't engage for the double action, so we're trying to avoid doing that.
- LJ: No, why I did it is to reduce the friction. I want to do it this way because of friction.
- RLJ: Sure. You'll find that the variance from one side to another - you'll find that the face of the hammer gets gouge marks in it. You can clean up the back of the slide as much as you like, but...
- JEH: This surface here must be the finish that Willy and I went over. Part of your problem is your finish here - any problem you have here acts like a file on the base of your slide.
- BURNS: I've polished it; I've polished it to virtually a mirror finish, and I've buffed the hammer, and it's still jamming.
- JEH: Well all that means then is that either the hammer is too high in the casting itself, or the hole through here where the hammer sits is too high, or it could be that your hammer spring is too tight.
- BURNS: My hammer spring is right down. This is screwed right in as far as it will go. I'm down to minimum pressure on my hammer.
- JEH: Or it could be one other thing - that this face is too high this way. Now that's the only reasons...
- BURNS: Well as I've got it...
- WR: This thing is not exactly flush with this face...
- JEH: Yes, that's what I'm saying. I'm just giving you the only reasons why that can happen. So if that's correct on the drawing, it's not correct on the parts or it's not correct in the machining - that's all it can be. It can only be so many things.

WR: Ideally it should touch that other face; it rides along on the whole surface.

JEH: Yes.

BURNS: And if it's riding on the whole surface it won't bind. I've had it to the extent where it's riding on the whole surface and it's still picking up tiny little pieces - somewhere - and it is gouging, and we have just put...

VJF: Joe, I'd like to just read a little bit of information on stainless steel regarding...: Stainless steel castings are not resistant to ... and seizing. The surfaces of the castings can be nitrited so that they are hard and wear-resistant.

JEH: We know that, Val.

VJF: Oh o.k. I thought maybe...

JEH: We took P4 and we nitrited the shit out of it, and I'll tell you something: It isn't as good as what we're getting when we do it right here. The problem with nitriting is that it's too thin so, if you really have a problem, it doesn't help you because it wears right through your problem. So nitriting on stainless steel - at least the way we work - doesn't help.

JK: The circular that you sent round...hardening by putting in nitrogen for a couple of hours. This was something that was recommended for all sorts of...

BURNS: What we did with Mr Jarvis was...

JEH: Does this involve us any further? You've told me what the problem is; I've told you the three solutions to the problem...

BURNS: But how can we check those holes? We've got no gauge that we can check those holes with as yet.

JEH: As yet...



BURNS: These are parts that are coming through, that have been passed through quality control, and we're getting them to assemble without being correct.

JEH: Well I suggest that, if you're getting parts that are quality controlled that you don't like, it isn't a product of this meeting; it's a product of your operation. It's a matter of your own operation at that end of the table, Phil.

There's only three problem areas: This hole is too high, the slide face is too low, and this face is too high, o.k? That's the only things it can be.

WR: Gentlemen, please can we go back to the meeting?

JEH: All right, Phil, do you have anything else?

BURNS: Nothing further.

JEH: O.k. On the problem you have now, this is part of the work here; they'll check the dimensions out but, if you aren't getting it on all of them, I suggest that, you know...

BURNS: I've noticed it on the majority of the ones I've looked at.

JEH: Well I'd like you to be a little more specific next time on that. For instance, if you've got it on eight out of ten, then we've got a major problem and we'd better do something. If you've got it on one out of ten, then we're still going to have to look at it, but there's only three areas that are causing problems in the gun. The three areas will be looked at by John to see if they're dimensional problems. I don't think it is because we haven't had the problem before. If you're going to get cold gauges, you may need that, but I'll tell you something else you are going to need as well - Jamie, could I see the slide, please - you're going to need a gauge that goes through this rail to this face

because, if that face is just an R.C.H. too bloody high, then that will cause the problem you're talking about, o.k? Roy?

RLJ: We've solved all my problems.

JEH: We've solved all your problems - that's nice! Jamie?

BRITES: Nothing today.

JEH: Nothing today? Oh come on! Well I have a question for Roy; let's go back to Roy. None of us has seen the work in progress report from last week's meeting. I handed you a note and you couldn't read my writing.

RLJ: Oh I see it says here projected materials, and I wasn't too sure. I have them here, but I see that the barrel figure is definitely wrong. It's definitely wrong, and I'll fix this up, because we've got a 2 200 work in progress from Ferroform last week and a 1 280 this week, which is not right.

JEH: Well the reason I'm asking this question is - has Jamie seen this report? He's seeing it now, but has he seen it before? I'm trying to get an answer for Jamie. How many barrels are work in progress, and how many and when can Jamie have, say, a quantity of 500 barrels? Now I want an answer to that question.

RLJ: That's fine; then it brings us back to this progress report from the Wadeville meeting, where it says that we have work in progress 2 200 barrels and - let me just get the right thing. Right, a new point that was raised on our snag sheet was that the sulphur content in the barrels has been increased according to the instruction from Professor Mavrocordatos on the 8th May 1978. Mike Herald has 2 000 barrels in the process of manufacture, and he awaits instructions from us as to whether he should proceed. The first batch with the higher sulphur content has already been received by Gear Ratio - that's a batch of 110 barrels. Now Mike said he would proceed with casting the rest of the 2 000 barrels, but he suggested that maybe we should tell him if we were happy with the high sulphur content which met spec. Now he says that, if I can let him know this week that he should continue, he will continue.

JEH: I talked to John Smith about that. He asked the question and I told John



that that was a question that he and Jamie could answer, and, if they, were happy, I was happy - all right? - it's that bloody simple.

RLJ: It's as easy as that except that, until Mike gets an answer, he isn't continuing with the 2 000.

JEH: Except that was done last week, so I'm asking you why Mike hasn't got his answer when his own staff don't give it to him. When did Mike tell you this?

RLJ: This was at Wednesday's meeting last week.

JEH: All right, I've talked to Mike since then, so I assume the problem has been solved, but...

RLJ: I'd also like to know what...

JEH: You call Mike Herald and ask him if the problem has been solved. If it hasn't been solved, then get back to me and I'll solve the problem. But what I want to know is when can Jamie - we've how many barrels in house now?

WR: 31.

JEH: I just heard 110!

RLJ: 110 are the new barrels with the higher sulphur content. The 31 are from a previous one...

JEH: When can I have the 110 barrels? That's the question I want to know.

BRITES: They are in house...

JEH: They're not in house, Jamie...

RLJ: They have been received here. They've got heat treatment to be done; they've got x-rays to be done. I'm assured that they've been delivered to Gear Ratio.

JEH: I want to know when 110 barrels can be given to Jamie. Now that's the

question I've asked; not to machine, when they're ready to be given to Jamie. Now I want an answer to that question.

WR: I think we must draw a line here and then, if we use the terminology that components have been delivered to Gear Ratio, I should like it to be done in the sense that they are delivered for machining - simply because we're doing heat treatment, homogenisation, analyses and God alone knows what, and it just doesn't work like that. You know as well as I do that we're handling the homogenisation process as soon as we can - we do it the moment we get the job through, but there's a lot as it goes through. We argue about compositions, about temperature ranges...

JEH: Willy, I understand what you're saying, but that's not germane to my question. Your point is well taken, and in future, if I ask how much is available to Gear Ratio, then it should be machining not heat treatment, all right. That question has already been answered, so I asked a second question. I want to know when those 110 barrels will be made available to Jamie. Now that's what I want to know.

WR: Well I can't answer that. I don't think anybody can answer that, because it is now in the process of being treated. Once it has been homogenised and heat treated and...

JEH: You're telling me that you don't know how long it's going to take you to heat treat and homogenise those barrels?

WR: I know how long it takes us, but then you must add the straightening into it, and you must add the foundry into it.

JEH: All right, so now I'm asking you: When will you have it done? See, my point is that, if I get those 110 barrels to Jamie, I want him to take them to whoever's going to gun drill them and have him gun drill those as a sample batch. A hundred barrels as a sample batch is a reasonable number, but Jamie can't make any effort on this unless we can tell Jamie when he can have the barrels so he can co-ordinate it with those people.

WR: Karl, when are you sending them to Atlas?

KF: This batch of barrels we have received have already got that new sulphur content...



JEH: We know all that.

KF: ...so this will probably take some time in the heat treatment now. It could be possible that John hardens those things, and he doesn't get the required hardness, and he has to do them all over again.

JEH: So you're telling me you don't know the answer to the question.

KF: No.

JEH: Would you check with John Currie tomorrow and let me know when I'm with John - all right? - because you see what I'm trying to do is get Jamie a hundred barrels he can take to these people who can gun drill these things.

KF: See, nobody gives us a guarantee that all hundred barrels are accepted by Atlas or Viper.

JEH: Yes, that's true. We realise that, but we've got to start somewhere, don't we?

KF: Yes.

BURNS: Can I come in here, Mr Hale? Mr Jackson's probably going to kick my shins in, but I've just been talking to Cecil behind the tape and he tells me that he's forced to accept stuff that he rejects. Are you aware of that?

JEH: By whom?

WR: By whom? Please be specific because this is a very touchy subject.

CB: It's not in the sense that anybody specifically, but what we've been doing at the moment is sometimes, when something is wrong, we still accept it and the blokes on the assembly bench - you know, we've got three blokes working there and, if I must reject stuff because a little hole is out or this is out, which can be rectified there, why should I reject it?

WR: Can I then just say that we will talk about castings and the questions

associated should be relative to them? Are you telling me that the castings which you are accepting are of high standard and in accordance with the specifications?

CB: In the beginning it didn't use to be...

WR: I'm talking as of today; never mind the history.

CB: Today the castings are up to standard.

JEH: That's what we're talking about is castings. If you are talking about accepting parts from Gear Ratio that don't meet our nominal specifications to keep people working, everyone at this table is aware of it so I don't understand why it is an astounding revelation. It's all been a product of the meeting.

BURNS: As a matter of fact I wasn't aware of this.

JEH: O.k., we all know that. We're all working towards that not being the case in the future, but that isn't even germane at this point in time because it has already been hashed over. Jamie? Willy?

WR: I haven't got much to say. I'd just like to - again I'm possibly mincing old meat but, just for the comfort (if you want to call it) of everybody, I think a lot of valid points have been made around the table, particularly by our American friends... I think we must see various comments in the context that they are genuinely in the sense of helping us, whereas against the parameters for us on the machining side...that we must relate our work to drawings. For instance, if we now discuss what should be machined, where and how and why, then this is very much the case, but I think we must see it in the light that John Kirtland and other people are going through the drawings now and, to me, the logical process, if the designer - which is Joe, does agree to certain recommendations, let's say the next generation - call it mark two or whatever you want - of those guns will have all those features. Whereas, at the present - and I again agree with you people - too many people have in fact got a big spoon to stir in the soup. I think we must accept it as an unfortunate fact of life that the meeting here, as far as I'm concerned - let's say as far as my interest rests, which is above all of getting this thing moving - I



think we are bound by what has been created previously, and let's say, if there's a fact of a bad casting or a bad decision regarding the machining symbol or the machining phase that stops us all, we have got a problem. But we only will be able to come to all the wisdom, if I may term it that way, once we get it on the paper; because, only once it's on the paper we really can react.

Regarding supervision and so on in the machining, all I can say is that may well be so, that we have to improve on that. I've been certainly open, and I think Lou and I have had various talks, and Jamie has been involved in that - but to me, and without belittling the problem, I think that's one of the teething things we've got, possibly due to the fact that we are always bearing in mind that production must go on, and at times unfortunately one as a human being is cutting corners. So to put it all in a nutshell, I think all of us have to contribute to get the corners away, and I'll acknowledge the assistance we've got from you.

JEH: I agree, Willy, and I appreciate that comment. There's one other thing I'd like to add and that is that no barrels are acceptable that have been delivered to Wadeville. Even for the gold plated models I cannot use those barrels. Lou says that there's a simple way of making them - at least the gold plated ones - so that they are cosmetically acceptable with a hand hone operation, so what I would like to do is get those barrels back here while Lou is still here so that he can work with Jamie, and Jamie can see the hand honing operation to get those inside bores so that we can gold plate them. Because, let me tell you gentlemen, our goals are exactly the same in that we have to have 18 gold plated guns by the end of this month. We may have another treat in store for you a little later, but we can't comment on that now. Yes, Val?

VJF: Can I add to that hand honing operation? If you have anything similar to what we call a ... hone in America, which is just a circulating stone in oil...

BRITES: I've got one on order which will be here within a couple of weeks.

JEH: I need these barrels now.

VJF: Does anyone have one around here that you can even borrow? Do you know

anyone who has a hone?

BRITES: You can't borrow one...

VJF: No, I mean you go over there with just your six or ten barrels just to polish...

JEH: 18.

VJF: ...18 barrels, because that one other gun is salvageable with the gold plating on. Just take the barrel out and just put it on the hone and work it back and forth a little bit...

BRITES: Yes, I'm sure the people who supply us with the machine will probably help

VJF: ...just hone it and it will take, say, two or three hours and all of your barrels will look internally beautiful.

JEH: So we can salvage the barrels we've got. Now we can't salvage this barrel; I didn't look at all of them, Jamie, but on that one somebody's let a piece of scrap get in there.

I also would like to thank everyone at this table, not just our American compatriots because they're still here working and helping, but I'd like to thank everyone at the table for the work that's gone into this. I see progress has been made since the last meeting I chaired, and I'm sorry Colin couldn't be here. I would particularly like to thank John and his team and everybody who's worked with them - well primarily Ian and his team, because it is Ian's team - for all the work that's been done. Also that model, I'd like it left here overnight, if you don't mind, as that's something - if you absolutely assure me that's to drawing, a lot of the problems that John tells me exist don't exist, so John and I have got to determine where the anomalies lie between your excellent model and our drawings and what we're actually coming off the production line with. That would be a help. If there's nothing else I'd like to close the meeting.

JK: There are just two things I'd like to bring up, please. One of them is that I'm not going to be producing any modifications to working drawings or anything. Is this expected of us at this point?



JEH: No it's not expected of you. You're still in the process of doing these things.

JK: The second point I'd like to bring up, which was something that arose while you were away, Mr Hale, was the purpose of making a comparison of a thousand rounds of ammunition. This was to try to get an idea of our chambering sizes and one thing and another.

JEH: That sounds like a marvellous idea, but that's not your problem! You need one round of ammunition, max, not a thousand.

JK: Where do you get it from?

JEH: Just any PNP round!

JK: But what we did was made a comparison to the SABS spec, and we found that all the rounds were well within the maximum size there; in fact they were excellent. The repeatability was quite incredible. I have copies of our report.

JEH: Well then just make it to the maximum size because, what we have to do to pass Bureau of Standards is - they use the maximum spec as their acceptance number.

Thank you very much. Who did this, John?

JK: We did it last week.

JEH: Could I ask a specific question of Ian? Ian, we've got Karl to help Lou and Jamie on these drawings, but it sounds to me like we're getting this project a little further advanced than I thought it was when I first walked into this meeting. Since John and I are going to be working together, could we borrow maybe one of your guys on Friday, if necessary, to help Karl, Lou and Jamie get these tools on paper? We don't want to take your people without asking you.

IAH: They're here now.

JEH: Yes, I'll talk to you over the 'phone. All right, can we adjourn? Are there any other comments at the table? Again I'd like to thank off of you gentlemen - progress is being made and I think it's good. The meeting's adjourned.